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American Leishmaniasis (Jungle Ulcer)

—A Tropical Occupational Disease—

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AMERICAN LEISHMANIASIS constitutes a somewhat distinct variety of the disease produced by the action of Lieshmania. It presents features dissimilar to kala azar, Leishmaniasis infantum and oriental sore. Just as kala azar and Leishmaniasis infantum closely resemble one another, so oriental sore and American Leishmaniasis are more closely related. This is particularly true in that these two last mentioned types are exclusively or foremostly confined to skin and mucous membrane lesions.

Under the general category of American Leishmaniasis, several forms may exist, or at least differences in characteristics of this disease appear in the countries of Middle and South America. On this account, there have arisen numerous scientific and local names designating the disease with its peculiar manifestations, such as arise in any locality, large or small. These terms include Leishmaniasis Braziliana, chiclero's ulcer, jungle ulcer, uta, espundia, buba, bouba, pianbois and forest yaws.

The commonest Anglicized name for American Leishmaniasis is "chiclero's ulcer," meaning the ulcer of chicle collectors. This very name implies that this tropical disease is an occupational disease, but so much emphasis has been placed upon this affection as a tropical disease that only inadequately has it been segregated as an occupational disease. In publications intended to be comprehensive with regard to trade diseases, "chiclero's ulcer" has not been found. Chiclero's ulcer, while primarily an occupational affection is not exclusively so. This statement applies with equal force to lead poisoning, a characteristic occupational disease, which no less may be found among non-industrial workers such as in persons consuming water supplied through lead pipes, from the drinking of alcoholics stored in lead vessels and among children from eating lead paints on baseboards, furniture and toys. In this same manner, American Leishmaniasis may be found to a slight extent among individuals living in or visiting the jungles, but without occupational connections. Further, it may be observed that American Leishmaniasis is not limited to the one occupation of chicle gathering, but may be found among mahogany loggers and similar jungle trades in several countries.

It is the chief purpose of this present report to describe chiclero's ulcer, one form of American Leishmaniasis, as an occupational disease, associated with the industry of raw chicle collection and preparation.

The Chicle Industry

CHICLE, the base of chewing gum, is the gum, latex, resin or sap of the tree known in Mexico and Guatemala as "Chico Zapote." In Maya, it is called "Yaa." "Sapote," "Zapotilla," and "Sapodilla" are other common names. Technically, this tree bears the name of "Achras Zapota Lineo." Several grades of chicle are known, the best being derived from the prime female sapodilla.

This tree grows to a height of 40 to 75 feet, when mature approximates 3 feet in diameter, has numerous branches, is evergreen, and is of marked slow growth. It is found in abundance in Quintana Roo, Campeche, Southern Yucatan (all being states or territories of Mexico in the Yucatan Peninsula), in the Petan portion of Guatemala, in Honduras and British Honduras and to a slight extent in the general vicity of Vera Cruz and scantily in other portions of Mexico and Middle American countries. Other trees yielding a latex similar to chicle are found in many South American countries, notably Columbia and Venezuela.

The industry in the Yucatan Peninsula leads to an annual export approximating (1937) eight million pounds. Exports reached a peak in 1929, when from all of Mexico there was exported 11,277,144 pounds. Almost exclusively chicle is utilized in the manufacture of chewing gum, but not all of chewing gum is chicle.

In the Yucatan Peninsula, the production of chicle largely is controlled by a few corporations, commonly dominated by United States interests, who operate under governmental controlled concessions. These corporations contract with camp operators, who in turn arrange with large numbers of chicleros (chicle gatherers) to enter the jungle at the proper season, where temporary and primitive camps are organized in the dense jungle forests where thrive the wild sapote trees.

Fig. 1.
Chicle blocks (marquetas) are molded in wooden frames after the evaporation of excess water. Each marqueta shows the initials of the chiclero, the contractor, and the camp.
(Courtesy Middle American Research Institute and the United Fruit Company, New Orleans)

Until recent years, pack mule caravans transported supplies for the chicleros into the jungle and on return trips carried loads of chicle to railheads, seaports, tram lines, etc. At the present time, much chicle is carried by cargo planes operated between shipping points (hatos) in the jungle and railheads or seaports. By these same planes the chicleros and their meager equipment, together with food for man and animal, are carried to chicle camps.

Only during the rainy season, approximating the six months including June and November, does the latex flow in the chicle trees. During May the chicleros with a few foremen, women, very seldom children, enter the jungle for preliminary operations such as the cutting of mule paths in all directions radiating from the concentration camp, setting up of evaporating equipment, the building of petty structures, at times the clearing of new landing fields. These chicleros usually are not pure Indians, since Indians are commonly not sufficiently hardy to undergo the rigors of the chiclero's work. Instead, the personnel is made up of a motley assortment of mestizos, Mexicans, and at times renegades and others from outside countries. At best the personal equipment of chicleros consists of a little extra clothing, a hammock, a very few eating utensils, but inevitably the machete — his tool for work, his weapon for defense, his badge of masculinity. A few chicleros carry shotguns for shooting game.

By the standards of the United States, sanitation in these camps is deplorable. In the aggregate, one contractor may employ as many as 800 chicleros, but this number is apt to be broken up into numerous small camps, representing some 15-25 of these chicle gatherers. To produce an annual output of 10,000,000 pounds of chicle, it is estimated that the services of some 13,000 chicleros, foremen and others may be required.

At all times there are numerous insects, but as the rainy season progresses, the insect population increases in numbers and varieties until toward the end of the rainy season a veritable horde of insect life surrounds the chicleros as they live and work. Malaria is rife, dysentery common, skin diseases plentiful. The usual chiclero is unconcerned about preventive measures although vaccination against smallpox is common.

The diet of these workers consists chiefly of corn, black beans, supplemented by the meat of wild game, including the peccary, deer, wild turkey, together with jungle fruits, chief of which is the fruit of the chicle tree itself, the chico sapote, or sapodilla plum, a succulent fruit of the size of a small apple, the flesh of which appears in three colors, white, pink and smoky grey. These three varieties may not appear in the same vicinity. Water is abundant in quantity, but the quality leaves much to be desired. Without restraint, the chicleros utilize and with apparent impunity water that might prove disastrous if consumed by the outsider.

When the rainy season is well under way, the chiclero attaches at the base of the trees a small fabric or rubber pouch or sac and then with his machete slashes the coarse bark in a series of irregular V's, 10-24 inches apart, on one side of the tree as he climbs upward, taking care that the cut grooves do not completely circle the tree, and thus cause its death. Tapping begins at daylight and continues only until mid-morning. The flow of the latex is immediate and is usually complete with the day. Rarely as much as 35 pounds may be yielded by a single mature tree. An individual chiclero may collect and prepare 300 pounds of chicle per month. The viscous resin is emptied from the small bag into a larger one (recogedora) and later into a still larger container (chivo), thence into a tin-lined evaporation kettle (paila). These kettles have a capacity of about 18 gallons. Each batch is boiled, starting with an equal quantity of water, for two or three hours. While the chicle is boiling, it requires constant stirring to prevent burning. After coagulation is complete, the mass is poured into wooden molds, where it congeals. These molds yield chicle blocks or cakes (marquetas) about 6″ x 8″ x 14″, weighing about 12 kilos, which is the unit for computing pay and

sales. These blocks show brand marks indicating the chiclero, the camp, the contractor and at times other data necessary in the computing of taxes.

Only after several years following the first tapping has sufficient recovery taken place to warrant retapping. Legally, a tree may be tapped once in four years in Mexico, once in seven years in Guatemala. The method of slashing is highly destructive and many thousands of trees die annually. The entire process represents baneful wastage of natural resources. Superior methods for the collection of latex in terms of tree conservation are available, but the intelligence of the chiclero is such as to make their application well nigh impossible. By the chiclero himself, and some of his foremen, the supply of sapote trees is considered inexhaustible. Native appraisal is to the effect that at least a hundred years' supply of wild trees is available. This belief as to inexhaustibility is not shared by the trained forester, who deplores the unnecessary destruction of a national asset and already foresees a comparatively early need for artificial cultivation of selected varieties of these chicle yielding trees.

After the molding of raw chicle blocks, multiple units are sewed up in burlap, and mule transportation to nearby plane landing fields is provided, where other shapes of bales are prepared in a better quality of burlap for plane shipment. In turn, at seaports, the chicle is tested for its water content and rewrapped in neat parcels of matting. Multiple units of these matting bundles are shipped to chewing gum manufacturing centers in the United States and elsewhere. Under other circumstances, the local transportation of blocks of chicle may not be by plane, but instead by dug-out canoes, barges, narrow gauge trains, mule packs, small steamers, etc.

The rainy season ends usually in November, but the sap continues to flow in December and January. If the contractor has been fortunate and has delivered his quota, the season's work may be terminated shortly after the end of the rainy season. The less fortunate and usual contractor finds it necessary to continue operations through December and January, but almost never after February 15. Whenever the season ends, the camp breaks

Fig. 2.

The Yucatan Peninsula is a portion of Mexico and is comprised of the states or territories of Yucatan, Quintana Roo, Campeche, Tabasco and Chiapas.

up, the chicleros with their season's pay or a portion of it return by plane or other transportation, or may walk to nearby towns and cities where for a period of three or four months they live in idleness, usually squandering their returns from grueling work in furnishing the world with its supply of chewing gum.

At the end of two or three years, all of the nearby trees in any one camp are exhausted in the absence of undue travel remote to concentration camps. This often means cutting off trees and the grubbing of stumps for new landing fields, always hazardous to plane travel, the transporting of evaporation equipment to the new center, all in preparation for the turning out of many thousands of pounds of chicle during the next coming rainy season.

In this jungle life and work, numerous chicleros acquire cutaneous Leishmaniasis. Under these circumstances, this disease may be classified as an occupational disease and as such forms the basis for this presentation.

Leishmaniasis

LEISHMANIASIS is the term applied to several types of affections produced by specific protozoa, Leishmania-donovani, which are closely related to trypanosomes. The four best known varieties were mentioned by name in a foregoing section. It is desirable that the three types other than American Leishmaniasis be briefly described for comparative purposes with the lengthier consideration of the fourth form, American Leishmaniasis.

Kala azar, or tropical splenomegaly is especially found in portions of Africa, India, China and Mediterranean Europe. After an incubation period of from 3-10 weeks, a systemic disease appears, characterized by fever, anemia, gastro-enteritis, loss of weight, skin petechiae and pigmentation. The significant pathology is associated with changes in the liver, spleen and intestinal tract, although death when such occurs may be the result of thrombosis of the cerebral vessels. In this disease, Leishman-Donovan bodies may be found in many portions of the body, including smears from the spleen, liver, bone-marrow and in the leukocytes of the circulating blood. Many insects have been associated with the transfer of this disease, including fleas, bedbugs, flies, mosquitoes, etc. Wide recognition is given to one biting fly, phlebotomus argentipes.

Leishmania infantile splenomegaly has been recognized in fewer countries and chiefly in Mediterranean areas. It appears almost entirely among under-privileged children living under unhygienic conditions. This form of the disease leads to marked enlargement of the spleen and cachexia; fatalities are common. Wherever this variety exists, an identical or similar disease may exist among dogs. It is presumed that the disease is distributed by blood-sucking insects, precise types of

Fig. 3.

Chicle Camp. Temporary camps are made in the jungle during the chicle gathering season. Here the chicleros live, and here the sapote sap is evaporated to proper consistency and molded into marquetas. (Courtesy Dr. S. J. Morley and the Carnegie Institution of Washington, D. C.)

which are unknown, nor is it known that this disease is disseminated by other than the same insects believed to be responsible for kala azar.

Oriental sore (Delhi boil, oriental boil, Aleppo boil, etc.), a third form of Leishmaniasis, is believed to be confined to the skin and mucous membranes. It is limited to tropical and sub-tropical countries and by some it is asserted that Leishmaniasis Americana is none other than oriental sore. However, clinical deviations, together with the behavior of the organism under laboratory conditions, at least suggest dissimilarity. In the oriental sore, the period of incubation is up to 10 weeks and usually not less than two. The lesion begins as a tiny inflamed area not unlike a mosquito bite and characteristically appears on those portions of the body unprotected by clothing. This small papular nodule, which may be multiple, gradually, over a period of months, increases in size. Clumps of nodules appear which may disintegrate into indolent ulcers, accompanied by granulating tissues. Later healed areas are associated with brownish pigmentation. Unless secondary infection appears, there may be little pain and no general symptoms. Glandular enlargement may occur. Scores of ulcers or warty-like masses may appear on the face, neck or other exposed areas. Spontaneous healing is common and recurrence of the disease is said not to take place. Leishman-Donovan bodies may be found in the exudate from these sores. Novy is credited with the first production of Leishmaniasis in animals under laboratory conditions. The disease may be transmitted from one animal to another, such as among dogs, monkeys; and human beings may be infected by materials taken from dogs. Laboratory cultures are capable of producing the disease. It is believed that multiple lesions on any one person may be produced by transference of the organism, by the hands, clothing, etc. Again it is necessary to state that the animal or insect host is not precisely known, although the consensus of opinion is that some insect or insects are commonly responsible for the initial lesion, although person to person transference appears possible. The occurrence of oriental sore in South America has been observed.

American Leishmaniasis. It is possible that the disease now known to be cutaneous Leishmaniasis was known to the tropical Indian long prior to the coming of the Spaniard. Certain early stone carvings or molded pieces present deformed ears, which by some are accepted as representing the damage of Leishmaniasis or perhaps surgical interference. This is unproved. Spanish physicians of the conquest period and shortly thereafter may have described the disease, but not with such clarity as unerringly to set it apart from other skin diseases of similar features. Certain it is, as a result of laboratory demonstration, that cutaneous Leishmaniasis has been encountered in many portions of Middle and South America, including the peninsula of Yucatan, Guatemala, Honduras, Peru, Brazil, Venezuela, and others. An extensive bibliography has appeared, chiefly in the Spanish language. It is to the credit of Shattuck and his associates that the physicians of the United States and other scientists have been brought in touch with this tropical disease and the literature that has grown up around it.

Fig. 4.
Slashing the sapote tree. The chiclero attaches a small bag at the base of the tree and then cuts a series of V-shaped grooves into the tree, avoiding complete encircling of the trunk. The gum flows immediately, and the flow is complete within one day.
(Courtesy Dr. S. J. Morley and the Carnegie Institution of Washington, D. C.)

Shattuck made three expeditions under the egis of the Carnegie Institution into the Yucatan Peninsula, Guatemala and nearby countries. The 1938 publication, "A Medical Survey of the Republic of Guatemala," brings together in authenticated form materials pertinent to American Leishmaniasis and particularly chiclero's, or jungle ulcer. This publication furnishes references and critical appraisal of the literature on the topic. A prior publication, "The Peninsula of Yucatan," appeared in 1933. Shattuck's publications extensively have been used in connection with the four minor tours of investigation by the writer that have furnished the material for this report. Many portions of the limited literature review shortly to follow are taken from Shattuck's extensive literature appraisal.

Limited Literature Review

PRIOR to 1909, there occurred many references in the literature descriptive of cutaneous diseases, particularly in South America, some of which may in truth have embraced American Leishmaniasis. In 1759, Sauvage and Charluis described a skin affection under the name "papilloma tropica," but in the absence of any knowledge of the causative agent this paper and many others may not be accepted as certainly referring to American Leishmaniasis. In Peru, and in countries thereabout, an endemic disease termed "Uta" long has been known and was described at least as early as 1840 by Smith. At a later time, Leishman-Donovan bodies were demonstrated in the lesions of uta, but it may not be believed with finality that all of the disease states described as uta are one and the same condition. Cerqueira in 1885 placed certain skin diseases found in Brazil in the category of oriental sore. Since genuine oriental sore may have been imported into South America from Africa, as a result of slave trading, it is tenable that these cases may not have represented American Leishmaniasis at all or at any rate not in that form or that strain now characterized as chiclero's or jungle ulcer.

With due regard for the possibility that American Leishmaniasis may constitute a pre-Columbian disease, and for the probability that Leishmaniasis in one form or another existed prior to 1909, it is necessary to fix that date as the time when with certitude, typical parasites were demonstrated in skin lesions. Working independently, this was done in that year by Carini and Paranhos, and by Lindenberg.

Since the very time of a bite or sting of any insect followed at a later time by the appearance of a lesion is unknown under well authenticated circumstances, the incubation period is open to doubt. According to DaSilveira, the average incubation period is from two to three months. Another observer, Aragao, states that the period ranges from one to three months. This is in conformity to other observations with regard to other types of Leishmaniasis. However, a few experienced physicians believe that the incubation period may be as little as two weeks and many natives working in the jungle state with conviction that a very short incubation period, such as three days, has been known. Such statements require scientific confirmation.

Auto-transfer of infectious material from one portion of the skin to another is well accepted, but it is not equally well established that this is the sole source of secondary lesions. The medium of the blood stream is held responsible for lesions of the mucous membranes (Lindsay). Bernasconi and Paterson state that even after apparent complete healing of cutaneous lesions naso-pharyngeal metastases may arise. Surface lesions other than of the skin are rare in the chicle country, but in South America, affections of the mucous membranes are common, are resistant to treatment, and the severity in the usual instance is notable.

With regard to suitable terminology designating the causative organism of American Leishmaniasis, some caution is prompted. Leishman-Donovan bodies are commonly described as the cause of kala azar. Rogers is credited with the first cultivation of these organisms. That this same parasite is the cause of all forms of Leishmaniasis, including jungle ulcer, is open to debate and some controversy has developed. It is probable that several strains of the organism exist and that under different environmental conditions dissimilar clinical and laboratory features appear. Shattuck states with regard to cutaneous types, that the distribution over the body and the severity is altered by locality. Climate, vegetation and race are mentioned as of possible significance.

Cultural differences have been denied by Wenyon, but some opinion remains to the contrary (Mayer). Some forms of Leishmaniasis are followed by prolonged or permanent immunity. In the case of jungle ulcers, this may not be true. Apparent healing may be followed months or years afterwards by renewed activity or else by reinfection at the same site. It is common lore among those afflicted that at any time, a supposedly cured condition may break out afresh.

Under experimental conditions, jungle ulcer (or at least some variety of American Leishmaniasis) apparently has been produced, both in man and lower animals. Shattuck cites Wenyon as having successfully inoculated a dog on the ear with material from a case of cutaneous Leishmaniasis in man. Strong likewise produced a lesion on the ear of a dog from a case of uta and from the dog's lesion Leishman-Donovan bodies were demonstrated in sections. In one instance, Montenegro transferred material from one cutaneous lesion of Leishmaniasis in a negro to a scarified area in another portion of his body. Twenty-two days later, a papule appeared and when sectioned Leishman-Donovan bodies were established as

Fig. 5.
Unloading chicle in New Orleans. Essentially all chicle is used in the preparation of chewing gum and the greater portion of the annual production, near 12 million pounds, reaches the United States. (Courtesy Middle American Research Institute and the United Fruit Company, New Orleans)

present. Other similar efforts to inoculate human beings were without fruitful sequelae. If this one transfer may be accepted as authentic, and it is not questioned, a background of proof is provided for the belief that auto-transfer by the patient himself is responsible in some instances for secondary lesions. However, it may be emphasized that the fact of multiple sores on a patient with jungle ulcer is in itself no proof that any or all of those other affections are in any way related to the Leishmaniasis.

In considering the source of the infectious material in Leishmaniasis (at this time without consideration of the vector) many inquiries have been directed to possible reservoirs. Over and over mention has been made of ulcers on various portions of the bodies of dogs, but chiefly ears, from which Leishmania have been recovered. Similarly, lesions have been found in the agouti and the horse. Legend rather than facts leads workers in the jungle to regard birds as the source of the infecting agent. The wild turkey, heron, buzzard, eagle, and pheasant, among others, have been described by patients as ultimately responsible for their condition. Many physicians perpetuate these beliefs in the absence of evidence. The very multiplicity of birds held responsible, prompts incredulity. Shattuck, without accepting the opinion expressed, presents the widespread local belief in the following language:

> "Dr. Montano shares the view which prevails in the region (Peten) to the effect that this disease is transmitted by the mosca de faisan (Olfersia coriacea), a common parasite of the curassow (Crax globicera). This bird is called by the local names pajuil or pahuil, kambul, faisan. He says that he has seen a few reliable cases in which the ulcer appeared at the exact spot which had been bitten not long before by the mosca de faisan."

At this time it is impossible to point to any domestic or wild animal as a known and important reservoir.

Until a more substantial body of facts is available, man himself appears to be the chief reservoir in the dissemination of this disease, although the mechanism of transfer from person to person, if such be the case, is unknown or at best little known.

Current Local Concepts

APART from direct history taking and examination, opportunity arose during the course of this investigation to interrogate a large number of persons familiar in some measure with jungle ulcer. The number includes chicleros, camp superintendents, pilots, chicleros' families, physicians, public health officials, archaeologists and others. While many of the statements made by these persons palpably are in error, a few persons were so familiar with the disease that their statements coincide to no small extent with those of scientists most familiar with the affection. After due weighing, the information gleaned has been segregated into two lots — that obtained from intelligent laymen familiar with the jungle and that from physicians largely in general practice and by no means specializing in tropical affections.

A. LAY APPRAISALS:

1. During the dry season, one or more cases of ulcerated ears may be seen in almost any pueblo, town or city. On questioning these persons, almost without exception, it may be learned that they have worked in the jungle one or more seasons or at least have traveled or hunted in the jungle. In these communities the disease does not spread and no new cases arise except as a jungle exposure is provided.

2. One period of work in the jungle or even a few days is sufficient to inaugurate the disease, however it may be transmitted.

3. The disease is rare among women and children, but does occur, but only among those who enter the jungle. Some men may work for years in the jungle and not acquire the disease, but nearly all of those who have long worked in the jungle eventually develop ulcerated ears.

4. The ulceration never starts except in those portions of the body that are uncovered. The prime site is the ears, one or both. Next is the cheek. The inner angle of the eyelids is a fairly common site, but the outer angle is scarcely ever involved. Since the worker in the jungle may strip away much of his clothing, so that any portion of the arms, shoulders, chest and lower legs may be exposed, ulceration may appear almost anywhere. Chicleros themselves rather than camp tenders chiefly are afflicted.

5. When the ulcerations are active, the disease may be transferred by the hands to other portions of the body, such as the genitals and rarely in the case of a woman to the breasts. However, common belief is that at times whatever inaugurates the initial lesion may also inaugurate other lesions in various portions of the exposed body. As one patient expressed it, "One fly bite me six times, or maybe six flies bite me."

6. The disease is most likely to appear in the latter half of the rainy season, when insects are more prevalent. This, however, may be without significance, since the incubation period may be as much as three months and thus about one-half of the rainy season. Further, the fact that few persons remain in the jungle during the dry season militates against any belief that only during the rainy season may the disease arise.

7. After apparent healing, and the elapse of months or years, activity may be renewed. However, it is the lay belief that no new bites will produce ulceration after healing has taken place, but during the period of any activity they maintain that they are especially vulnerable.

8. Single ulcerations and usually of the ears are the rule, to which there are many exceptions.

9. The ulceration is never painful, but at the outset itching is wellnigh intolerable. Pyogenic infection is common and when syphilis and Leishmaniasis co-exist, the local condition is much more severe. No systemic manifestations arise; no weakness, elevated temperatures, loss of weight is known to arise except when complications exist.

10. The greater number of chicleros never receive treatment, usually do not lose any time from their duties; no one has even been known to die from this disease.

11. The chiclero usually believes that the disease is transmitted by a flying insect, which either bites or stings. He is equally well convinced that this insect is associated with birds, but each native is likely to associate the fly with a different bird, such as the turkey, heron, pheasant, crane, parrot, etc. Most natives claim to have seen the fly but scarcely any two provide the same description.

12. Older natives vouchsafe the opinion that a few cases last 25 years, but that such instances are few and that the greater number heal up within a few years without much treatment, but usually associated with exacerbations.

13. The chiclero himself places no reliance upon the therapeutic value of cautery, excision, or salvarsan.

14. Contrary to scientific opinion, many natives believe that ulcers may be initiated within a very few days, such as three to 10 days after exposure. They cite the single trips into the jungle for hunting purposes, lasting only a few days, followed within a week by the appearance of papules, which eventually become characteristic ulcers.

B. Medical Appraisals:

Physicians rarely enter the jungle. Chicle camps are without the services of physicians as a rule. No less, almost every physician in small towns and cities throughout the Yucatan Peninsula sees at least occasional cases and renders professional services. A few physicians serving insurance companies have opportunity to see and treat fairly large numbers of this disease. A consensus of local medical opinion is somewhat as follows:

1. After treatment with antimonials, it is almost impossible to detect Leishmania. From new and untreated ulcers, organisms may be found in smears in about 50% of examinations. A preference is expressed for Giemsa stain and organisms are as a rule intracellular, being found in the white corpuscles. Organisms may lie free and apart from any cells, but are never in the erythrocytes.

2. The organisms are never found in the circulating blood, but may be found in the blood that exudes from ulcerated surfaces.

3. Ear lesions are so characteristic that laboratory examinations rarely are made.

4. Ulcerations about the eye are most likely to produce grave injury and this because of secondary involvement of the eyeball.

5. The distribution of the lesions is that described by the patients, as mentioned above, but physicians emphasize that any portion of the skin surface may be secondarily affected.

6. Glandular enlargement is not a prominent feature in the absence of secondary pyogenic infection, but nearly always trivial enlargement of cervical glands may be detected when the lesion is on the ear or face.

7. Lesions on mucous membranes are practically unknown among chicleros, but have occurred.

8. Leishmaniasis is not limited to any race, sex, age, type of employment, but the one essential is that the patient enter the jungle. While the majority of cases arise among dark-skinned persons, it is well recognized that the great preponderance of workers are dark-skinned.

9. No evidence is in hand of any generalized or systemic involvement. The situation is made difficult because many patients with Leishmaniasis simultaneously harbor malarial organisms, may present enlarged spleens, along with other manifestations of malaria or other diseases. The possibility that systemic involvment may arise is not denied, but at least such is not recognized.

10. Physicians widely accept the lay belief that the vector is associated with birds. Various physicians lean toward one or another class of insects, but usually the phlebotomus is culpated.

11. Physicians regard the incubation period as long, and up to 12 weeks. Some cite instances in which there is some reason to believe that the incubation has not been longer than 10 days and even three days. All believe that auto-inoculation produces new lesions, but some are willing to believe that circulatory transfer also may take place. A few physicians attest the probability that through direct or indirect contact person to person transfer may take place without the necessity of any insect intermediary.

12. The prognosis after proper treatment is excellent. Using organic antimonials, two weeks to four are sufficient for substantial control. Those cases that recur ordinarily have not received good or sufficient treatment. The earlier the treatment is inaugurated, the better the result. Mucous membrane lesions never arise when proper treatment early is instituted. Tartar emetic is a dangerous drug because it induces sloughing and produces great pain. Arsenicals are without value. Local treatment is sometimes necessary because of secondary cellulitis. A very few cases are resistant to all treatment, but this number is usually limited to neglected, long existing ulceration. If excision is attempted, generally bad results are expectable, and organisms may be found at times in ulcerated excision wounds.

13. The incidence of Leishmaniasis among chicleros varies from camp to camp. Some camps furnish practically no cases and in others practically every person there has or has had the disease. The wetter the season, the greater the incidence of Leishmaniasis, and it is possibly true that prolonged wetness exacerbates some otherwise quiescent lesions.

14. Local physicians do not know of the occurrence of any kala azar or oriental sore. Furthermore, they state that apart from ear ulceration, they would not be able to differentiate between jungle ulcer and oriental sore.

The Vector

TO ANYONE acquainted with the insect population of the jungle, and the difficulties encountered in attempts to carry out laboratory work under such primitive and dangerous condi-

tions, the problem of establishing the vector will be manifest. All evidence points to the deep jungle itself as the place in which infection originates. Although men, women and children may acquire this disease, only those who actually penetrate the jungle appear to be involved. As a natural consequence, the preponderance of cases arises in men, since women and children seldom enter the jungle. Among those persons who remain in small clearings within the jungle, this affection does not arise. It is not known that a single case of chiclero's ulcer has ever appeared in a town or city unless the afflicted one previously has entered the jungle. One possible exception to this statement may be necessary, since at least in one instance persons developed Leishmaniasis, but not necessarily jungle ulcer, while living in a city, but surrounded by an abundance of tropical vegetation planted in patios. The foregoing observations at once militate against the belief that the common vector of this disease may be bedbugs, fleas, lice, house flies or insects commonly associated with the domiciliary life of humans.

It is noteworthy that with rare exception the primary lesion of jungle ulcer is on exposed portions of the body and chiefly the ears. Some "jungleros" are prone to remove much of their clothing during periods of some types of work so that the occurrence of a primary lesion on parts of the body customarily clothed in most occupations is not remarkable in connection with the general thesis that lesions customarily arise on portions of the body exposed to a flying insect. Apart from the possibility that Leishmania conceivably might be brought in contact with the body, by rubbing against the vegetation or insects directly on vegetation, all evidences point to a flying vector. Again it may be emphasized that the common circumstances of acquiring the disease and the site of the disease point away from the probable conveyance of the disease by crawling insects, such as ticks. Toward the solution of this problem, Dr. Shattuck, with his associates, Drs. Clark and Bequaret, has contributed much through the collection and identification of various ticks, mosquitoes, horse and deer flies, lice, fleas, etc. While indicating that chief evidence centers about the phlebotomus fly as the vector, they are prompt to indicate the incompleteness of proof and recognize certain objections to this theory. They quote Wenyon as follows:

"1. Leishmania, so far as is known, undergoes a cycle of development only in certain species of phlebotomus.

"2. In the course of this development Leishmania invades the proboscis of the insect and can pass out from it when the insect feeds.

"3. Sanflies have been infected directly from man by feeding on cases of kala azar and of oriental sore.

"4. Specimens of certain species of phlebotomus living in a wild state have been found infested with Leishmania.

"It is evident that the problem has not yet been completely solved but the facts that in one or two cases transmission by the bite of the sandfly has been effected, that there is undoubtedly a specific relationship between Leishmania and these insects in the light of the remarkable development that takes place, that the flagellates in the sandfly are virulent and are known to escape from the proboscis during feeding, afford overwhelming evidence that sandflies are responsible for the spread of the two diseases kala azar and oriental sore."

Fig. 6.
American Leshmaniasis produces severe skin lesions and very rarely mucous membrane involvement. The ears are the commonest site of attack and initial ulcers rarely appear on other than exposed portions of the skin.
(Courtesy Dr. Rodrigues Arjona, Merida, Yucatan)

In 1927, Aragao ground up flies (phlebotomus intermedius) which three days previously had fed upon a patient with Leishmaniasis. This emulsion was then inoculated into puppies. Only one puppy survived the presumed incubation period of Leishmaniasis, but this one developed at the site of inoculation a nodule which proved to contain Leishmania. This experiment has been projected as proof that phlebotomus is at least one vector, but more critical observers have contended that any other insect so ground up and inoculated after only three days interval following contact with an ulcer might as readily have transmitted this disease and on a purely mechanical basis.

These workers (Shattuck and others) conclude: "It seems highly probable that all forms of Leishmaniasis are transmitted usually by the bites of certain species of phlebotomus. Should this hypothesis prove true, it is still possible that the disease may be transmitted occasionally by other vectors and that ulcerating forms may sometimes lead to infection by direct contact or even indirectly by contact with infected clothing, bed or towels. Circumstantial evidence indicates that American Leishmaniasis is usually transmitted by a winged, biting insect, which lives among trees or shrubs."

The foregoing is accepted as reflecting the consensus of scientific opinion, that the phlebotomus is the common vector and implants the organism in the course of blood sucking. Contrariwise, or on a supplementary basis, it may be observed that the chiclero in the course of slashing thick bark trees produces many flying chips and consequently many small abrasions may be present on the very portions of the body where ulcers most commonly arise. It is conceived that insects feeding on exuded blood may mechanically transmit the disease from the afflicted worker to the unafflicted. It has been observed that drops of blood drawn from normal persons and exposed to feeding insects promptly show a content of Leishmania. Without denying a major role played by the phlebotomus, it is contended that some possibility exists that many insects that feed on the bloody skin surfaces and are present in the jungle may transmit this disease from the sick to the well. It is significant that the chicleros, who are the workers most subject to trivial skin abrasions resulting from their activities, are more often afflicted than those other workers whose duties do not include tree slashing. This statement is made with caution, since the number of chicleros always is greater than other types of workers in these camps.

Typical Personal Cases—Lesions

THE quantity of clinical material available for study far exceeds the facilities of the casual investigator. In Merida, the capital of Yucatan, the most severe involvements were seen, since because of severity the cases were sent in from jungle camps to this medical center. Since the time of observation coincided with the closing up of chicle camps, chicleros were returning to their homes in pueblos and larger communities and it was possible to find clinical material at airports, railroad stations, etc. Further, some camps were still operating and opportunity was provided to observe cases in one camp. In the aggregate, cases were seen from Campeche, Yucatan and Quintana Roo. One chicle "boss" stated that in his camp of 800 workers, from 400 to 600 presented some evidence of present or past afflictions with chiclero's disease. Of this number, by far the major portion presented only scars, chiefly of the ears. Opportunity to verify this statement did not arise and may be doubted. In the course of two weeks' time, this observer saw rather than examined some 50 cases and examined of this number 20 patients, but no examinations were adequate or complete, because of handicaps of language differences, laboratory inadequacies and time. Laboratory examinations in Merida on untreated cases irregularly yielded Leishmania, but in the greater number of instances treatment already was in progress. Smears brought into the United States prior to staining regularly failed to present the organism.

SPECIMEN CASES:

Patient FM, chiclero, age 25, mixed breed, including Indian; working in camp near Flores, gives a history of then having chiclero's ulcer for the first time. Patient states that all of his seven ulcers appeared at approximately the same time and he believes that each ulcer represents a separate fly bite. (This may be doubted.) Patient states that he has worked throughout the chicle gathering season (June-December), but is uncertain as to the time of bites that led to ulceration. He does know of fly bites immediately preceding the appearance of ulcers, but the significance

Fig. 7.
Characteristic ulcerations of American Leishmaniasis. Case of F. M. described in the text. Other lesions on elbows, ear and neck, some of which are shown in subsequent pictures.

of this statement is uncertain. At the time of this investigator's first examination, this patient already had received six injections of "Neostibosan." Patient stated that all ulcers began as single "pimples" (papule). After a few days, other "pimples" appeared around the first and then became as one. During the first three or four days itching was prominent, but no pain occurred at any time. According to the patient, scratching first produced raw surfaces, but at no time was pus noticed or any other discharge. At no time has there been any feeling of illness, malaise, headache, or discomfort. No loss of weight is known and no known elevation of temperature. The patient states that transportation and medical care are furnished by his employer or insurance company, but no compensation for lost time, which is possibly due to the termination of the chicle season.

On examination, seven distinct ulcers were noted (see photographs), two on the left cheek, over the malar bone; the most severe one was behind the right ear, two on the neck in the midline, one on the fore-

arm, on the outer side of the posterior aspect, one near the left elbow on the inner aspect. No ulcers were observed on the ear lobe itself, which is a common site. All ulcers showed signs of healing, particularly the retro-auricular ulcer. All of these ulcers are indurated at the periphery, crater-like, without exudate, red with purplish tinge, desquamating at the remote periphery, not hot to touch; no detected obvious glandular involvement. Four ulcers, namely those on the neck and arms, are sharply punched out with a depth disproportionate to the diameter, the depth being approximately ½ centimeter. The edges of the lesions of the face are irregular, as shown in the photograph. The lesion

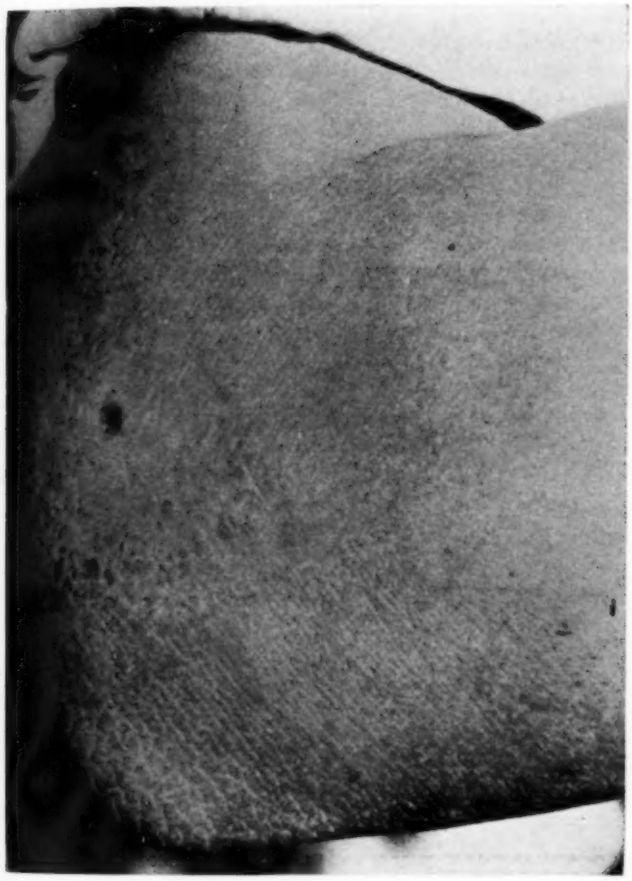

Fig. 8.
Case of F. M., ulcer of elbow, as described in the text, and mentioned in the legend of Fig. 7.
(Figs. 7 and 8, Courtesy Dr. Mario Villamil, Merida, Yucatan)

behind the right ear is linear, the length of the denuded area being about 2 centimeters, and the general appearance is that of an incised, healing, cutaneous abscess. No odors are present. The left eye is slightly inflamed and patient complains of pain in this eye.

This patient is unconcerned about his condition, fully cooperated in the making of motion pictures, anticipates complete recovery within two weeks and expects to return to the jungle with the advent of the next rainy season.

Hunter, age about 56, chiclero and hunter in jungle at Los Livics; mixed race, including Indian. This patient states that his left ear has been ulcerated for a longer time than he can remember and possibly 25 years. Has had no treatment other than self-applied palliatives. Condition alternately heals and recurs three or four times yearly. Condition always worse during rainy season and tends to heal during dry months. Suffers no pain, but is annoyed by soiled personal and bed clothing during active periods. No other person in the family has acquired the disease. States with definiteness that his and all other cases are due to bite of a fly that lives on wild turkeys and that after shooting these birds frequently has seen on their bodies the very fly to which he attributes the disease. (Such statements are open to scientific doubt.)

On observation, it is noted that the left ear is much thickened, serrated, creviced, with red lines of inflamed tissue at the base of the crevices. Apart from color and serration, this ear somewhat resembles an enlarged cauliflower ear. There is no complaint of pain on touch or pressure or other pain, and on grasping between two fingers it has the general texture of a thick locust pod.

This case is presented because of its bearing on statements as to rapid, spontaneous healing, immunity and communication to other persons.

Patient CC, 54 years of age; mixed breed, including Indian; seen at Peto, Yucatan. Presented ulceration of the right ear of one year's standing. Has long been a chiclero in many camps in Yucatan and Quintana Roo. Not at this time working and has not worked this chicle season. Has suffered from same disease before, has had ear cauterized by heat during previous disease; also was treated by salvarsan, both without good results. Is now being treated with "Fuadina," and undergoing a second series of treatments.

On examination, it is obvious that the condition is of long duration, with only a limited activity at present. The ear is enlarged in comparison with its fellow, thickened, nodular, apparently congested, low grade indolent ulceration, and cyanotic, although general dark skin prevents proper appraisal. No definite adenopathy was detected, no increased warmth on touch; no exudate; no evidence of secondary infection. This ear condition is much less severe than that in other persons carrying out full duties, wholly ignoring the disease state.

In the foregoing, there are presented three types of cases, namely, (1) acute with multiple lesions undergoing healing, (2) a long-standing, neglected, untreated unilesion, and (3) one of long standing, much treated, but resistant to treatment regarded as specific.

With the exception of initial papules, deformities, scars of healing, the foregoing embraces the types and stages of the disease as observed in the larger number of cases. It is to be borne in mind that these statements are limited to the chiclero ulcer variety of Leishmaniasis. In other localities and in other countries, additional and dissimilar manifestations may arise, such, for example, as metastatic invasion of mucous membranes, as is said to occur in South America.

The Diagnosis of Jungle Ulcer

AT THE hands of long experienced physicians, the diagnosis of jungle ulcer when it appears on the ear is usually justified in the absence of demonstration of micro-organisms. When primary lesions appear elsewhere, they are likely to be less characteristic and un-uniform, depending upon the parts affected. For example, an ulcer in the inner canthus of the eye may share few features with an ulcer on the deltoid. Attempts to demonstrate Leishmania are not regularly successful, even under conditions of good technical procedure. The difficulty increases after any treatment with antimonials. Rarely are organisms plentiful. The percentage of positive findings is far lower than the demonstration of treponema pallida in chancres, or inclusion bodies in trachoma.

No less, proof positive depends upon the finding of Leishmania, in smears, in tissue sections, or in cultures.

Blood smears from the general circulation almost invariably yield negative findings. If secondary infection is present, the pus present may not contain the parasites. If crust be removed from the edge of ulcers, and smears made from the exudate from the raw surface, examination may disclose the parasites, after staining either by Romanowsky or Giemsa stains. At other times, aspiration of fluid from deeper tissues or glands in the neighborhood may lead to materials containing Leishmania.

Shattuck's publications furnish some data anent the cultivation of the parasite as a diagnostic procedure and the preparation of tissues for examination after sectioning. Likewise, this author indicates some values for chemical, serological and enzymic reactions.

Notwithstanding handicaps to absolute diagnosis of jungle ulcer, it should be recognized that in the great majority of cases, the patient with ulcerated ears appears before the physician, self-diagnosed, and with warrant the physician may accept the patient's diagnosis.

Treatment

CHICLEROS with jungle ulcer have indulged in almost endless types of local treatment, self-administered, including salves, oils, salt, vinegar — all without consistently good results. Physicians have excised portions of ears, utilized electric and heat cauteries, administered divers arsenicals, and applied various topical medicaments. In the absence of complicating secondary infections, syphilis, etc., these forms of treatment have not yielded remarkable results. Early spontaneous healing largely accounts for the faith in the forms of treatment mentioned. Commendable treatment now centers about the use of organic and inorganic antimonials. Vianna first promoted the use of antimony and potassium tartrate in American Leishmaniasis. This treatment, while successful in the usual case, is not invariably so, and further tartar emetic is so destructive of tissues that application is limited to intravenous injections. As a consequence, there have come into use several organic antimonials, bearing such trade names as "Fuadina," (neo-antimosan), "Stibosan," "Neo-Stibosan," "Urea-Stibamine." In general, these antimonials are the counterpart of organic therapeutic arsenicals. Stibosan is sodium meta-chlor-para-acetyl-amino-phenyl stibiate. *Tropical Disease Bulletin*, Vol. 30 (1933), embraces several articles dealing with these organic antimony compounds. While superior to tartar emetic, not all of these newer compounds are entirely devoid of the prospect of pain when used intramuscularly. Some preference has been expressed for trivalent antimony compounds over pentavalent varieties. Since "Neostibosan" and "Fuadina" at this time enjoy favor, greater details are now furnished as to their nature and use.

This information is derived from the manufacturers.

NEOSTIBOSAN (The diethyl amino salt of para-amino-phenyl antimonic acid)

Preparation of the Solution:

Inasmuch as Neostibosan is readily dissolved, the physician is able to make the solution in the small ampoule containing the powder. Proceed in the following manner: The neck of the ampoule is filed and broken off with care. With a syringe containing sterile water, a drop or two is introduced into the removed neck of the ampoule in order to dissolve the small portion of the powder that may have remained in it. This trace of dissolved powder is aspirated into the syringe. Next the sterile water in the syringe is introduced into the ampoule itself by directing the stream of liquid under pressure against the inside wall of the ampoule, at the same time rotating it. Unless solution is complete, aspiration into the syringe should be repeated a sufficient number of times to bring about complete solution.

Fig. 9.
Retro-auricular ulcer. Site not characteristic. One of seven ulcers as described in the text, some of which are shown in other pictures.
(Courtesy Dr. Mario Villamil, Merida, Yucatan)

The preparation of the solution does not require heating or procedure other than just mentioned. The use of a new needle is preferable for each injection.

Indications:

Leishmaniasis, and all other tropical affections in which antimony therapy is indicated.

Use:

Neostibosan can be used intramuscularly as well as intravenously in solutions of 5 to 10%. The quantities of redistilled water necessary for ordinary dosages are as follows:

Dosage	Solution of 5%	Amount of Redistilled Water Solution 10%	Isotonic Solution
0.05 gm.	1 cc.	0.50 cc.	0.20 cc.
0.10 gm.	2 cc.	1.0 cc.	0.40 cc.
0.20 gm.	4 cc.	2.0 cc.	0.80 cc.
0.30 gm.	6 cc.	3.0 cc.	1.20 cc.

Neostibosan is well tolerated after intramuscular injection and produces the full therapeutic effect. Introduction into the gluteal muscles about 4 cm. deep is the site of choice. Patient should not be injected with antimony either with a full stomach or when hungry. Injections (particularly intravenous) should be carried out slowly. A light diet is recommended throughout the period of treatment. Vomiting may occur in which case the recommended dose should be reduced. If for any reason the course of treatment is interrupted, new treatment should start with the initial small dose.

Dosage:

Dosage According to Weight	Initial Doses	Subsequent Doses
Less than 13 kgs.	0.05 gm.	0.10 gm.
Up to 23 kgs.	0.10 gm. up to	0.20 gm.
Up to 27 kgs.	0.15 gm. or	
	0.20 gm. up to	0.25 gm.
More than 27 kgs.	0.20 gm.	0.30 gm.
	maximum	0.45 gm.

Manner of Treatment:

(a) For the intensive treatment (following experiences with kala azar) eight to 10 injections have been given for eight to 10 consecutive days in accordance with instructions. During the period of treatment, fever may be produced, which disappears on the stopping of the injections. After the last injection, it is not desirable that other injections be inaugurated in the absence of a two weeks' observation period.

(b) If the condition of the patient is such that the daily injections of antimony do not appear warranted, Neostibosan is administered every two days for a total of eight injections. (Duration of treatment 16 to 18 days.) Clinical effects of this method usually appear after the fifth or sixth injection, but even so the full course of treatment should be carried out.

Contra-indications:

In ascitis and nephritis, Neostibosan is contra-indicated. In pneumonia or jaundice, treatment with Neostibosan should be withheld until recovery from these acute diseases.

FUADINA (Antimony III bis catechol sodium disulphonate)

Method of Use:

Injections of the solution provided may be given intramuscularly without pain. The dosage depends on the general condition of the patient with due regard to weight. The total treatment requires from 40 to 50 cc. in patients up to 60 kgs. Since hypersensitivity occasionally is encountered, it is recommended that the initial dose be small, such as 3.5 cc. Subsequent injections may be increased up to 5 cc. Ordinarily 10 injections are sufficient for the eradication of Leishmaniasis. The first three injections should be on successive days, but subsequent ones may be administered at greater intervals. Children tolerate Fuadina better than adults, but it is desirable to adhere to the principles of 1 cc. for each 10 kgs. of weight as a maximum. The total treatment for children should not exceed 1 cc. for each kilo. Also in children, the initial injection should be small in proportion to that above specified for adults.

In treatment, an all-glass syringe is preferable, together with a well plated needle. The liquid contents of the ampoule should be used immediately because air oxidation readily occurs.

Containers:

For adults: Each with one 3.5 cc. ampoule and 9 ampoules of 5 cc.

For children: Each with one 0.5 cc. ampoule and one ampoule of 1.5 cc. and eight ampoules of 3.5 cc.

Stabilized Fuadina:

A special form, unlike the solution dispensed in ampoules is available, which is not altered by the action of air. This preparation is dispensed in bottles of 25 and 50 cc. and is suitable for mass treatments.

Not all physicians adhere to manufacturers' instructions for the use of these antimonials. In some instances, the interval between injections is increased and in others the total number of injections is larger than above indicated.

Mucous membrane lesions, which always are secondary and presumably metastatic, are said to respond readily to the action of organic antimonials.

Whatever treatment may be utilized, it is highly desirable that these therapeutic measures be instituted promptly after the appearance of the initial lesion. To some extent, it may be believed that the desirable end results stand in some relation to the promptness of treatment after first detection. It is noteworthy that Leishman-Donovan bodies, never found with regularity in smears from lesions, and rarely in large numbers, are found only with great difficulty after the institution of proper treatment with organic antimonials.

Prophylaxis

UNTIL a conclusive body of facts associates the distribution of jungle ulcer with some insect, animal or plant, or otherwise its dissemination is accounted for, prophylactic measures must necessarily be based upon conjecture. Present day leaning definitely is toward the concept that a winged insect or insects is the vector. For this reason, prudence will prompt the wearing during the daytime of protective fine mesh netting for the face and suitable coverings for the hands, arms, and other portions of the skin that might otherwise be exposed. At night, sleeping invariably should be attended by a surrounding of netting whenever in or near to jungle areas wherein Leishmaniasis is known to arise. The protection thus afforded constitutes presumptive protection against the vector of Leishmaniasis and of greater importance affords protection against other disease-bearing insects that might convey more dangerous diseases. Without full warrant, it may be urged that some values may reside in the application of oily, odoriferous materials to the skin, and possibly clothing, as a repellent to some insects. It is possible that the judicious use of various chemicals utilized in the treatment of Leishmaniasis may serve as a preventive barrier, but insufficient data are in

hand. These suggestions are made chiefly with respect to protection against Leishmaniasis. In general, it is to be emphasized that other precautionary measures are requisite to any entry into the jungles by casual visitors, such as with regard to water, food supplies, prophylaxis against malaria, paratyphoid, etc.

The attitudes, inclination, intelligence and cooperation of the chiclero are such that the measures above mentioned scarcely are applicable at this time. Efforts to surround the chiclero with freedom from prospects of Leishmaniasis must be found in specific measures analogous to small pox vaccination, or in the freeing of work areas from the vector, similar to control measures against malaria in other countries.

At this time, it is believed that feeding upon the blood or exudate from the inevitable trivial abrasions of the face and upper portion of the body of chicleros, caused by flying bark, by a variety of flies and other insects may be related to the high incidence of Leishmaniasis in this particular trade. If this assumption proves to be a fact, it naturally follows that the prevention of these minor breaks in the skin is desirable. As noted elsewhere, superior methods for the tapping of sapote trees are available. The need for better skin protection may afford just one more reason for the introduction of improved trade practices.

Public Health Significance

IN ALL of those countries of Middle and South America, in which American Leishmaniasis appears, this disease merits public health concern. However, by no means is it of the same order of importance as malaria, yellow fever, helminthiasis, etc., where these diseases exist or the threat of them exists. It is important to recognize that the severity of American Leishmaniasis distinctly varies in localities comparatively closely situated. In one country, jungle ulcer may lead to prolonged disability and the absence of the prospect of ready spontaneous healing. In another, the order of severity may be so low that disability only infrequently arises, spontaneous repair occurs, and reactivity is unexpected.

Toward the eventual elimination of this disease, or its satisfactory control, a number of basic scientific activities are requisite:

(a) Determination beyond conjecture, of the vector of this disease and its bionomics.

(b) The establishment of the natural reservoirs of infectious material, other than man himself, if such exist.

(c) Already European strains of Leishmania probably have been introduced into the tropics of the Americas, leading to a low incidence of oriental sore, kala azar, etc., thus adding confusion to differentiation between the clinical manifestations of American and European Leishmaniasis. It is highly desirable that laboratory activities lead to exact differentiation before greater intermingling further hampers the opportunity. Basically, there may be no difference between oriental sore and cutaneous American Leishmaniasis. If in fact such is the case, proof should be adduced in order that scientific publications may not perpetuate errors in classifications and definition.

(d) The occurrence of American Leishmaniasis among animals, chiefly dogs, frequently has been reported, but always under circumstances leading to some doubt as to authenticity. This should be clarified.

(e) It is widely conceived that immunity is conferred by one attack of jungle ulcer. While proof is inexact, in some instances apparently healed lesions become reactive at irregular intervals over periods of years. It is not known if this is the result of reinfection or instead is related to the previous infection. Conclusive observations should be made.

(f) Multiple lesions on a patient are common and auto-inoculation and metastases apparently occur. On the other hand, there is no or scant evidence that transfer of the disease from person to person occurs. This has led to the belief that biologic changes may take place in an intermediate host. Manifestly the determination of these changes if such exist must await the detection of this intermediate host(s) or vector(s).

(g) The clinical features of jungle ulcer, when the lesion appears on the ear, are ordinarily so characteristic that diagnosis is justified in the absence of exhibition of Leishmania. When the primary lesions are on other portions of the body, simulation of other diseases is greater and precise diagnosis in the absence of demonstrable Leishmania is less warranted. Since demonstration of Leishman-Donovan bodies under present laboratory practices is far from constant, it is most desirable that improved technical procedures be devised for the more ready detection of the causative agent.

(h) Several chemical and biologic tests other than the finding of the organism have been described and specificity has been claimed. Additional inquiry should be directed to the suitability of these tests for diagnostic purposes and particularly in relation to peculiarities that exist between several different strains.

With regard to the public health threat of American Leishmaniasis to the United States, at once it may be said that no major invasions of that form here under discussion, that is, jungle ulcer, may be anticipated. It is true that biting varieties of the phlebotomus fly have been found in the United States, chiefly in Texas. Should this insect prove beyond peradventure to be the vector, distribution of the disease might be provided for in the presence of sources of infection. It is equally true that persons bearing this disease in its incubation stages or with lesions apparently but not factually healed might enter the United States and the areas therein in which the vector resides. No less, the practical threat that this disease may become widespread in the United States is negligible.

Jungle Ulcer as an Occupational Disease

IN THE case of the chiclero, jungle ulcer, a parasitic affection, is a characteristic occupational disease, just as is the case of the tannery

worker who may acquire anthrax from the hair of the skins with which he works, or the miner who acquires ankylostomiasis from contact with alvine discharges from unsanitary mine practices. It is to be emphasized that apart from any occupation, jungle ulcer may occur under conditions nowise warranting inclusion in the category of occupational diseases.

As an occupational disease among chicleros, this affection may lead to disability, to medical expenses, to loss of income, to discomfort and unsightliness, to disfigurement and mutilation. The incidence of this disease among chicleros apparently ranges from 10 to 70% of those exposed, depending on individual camps, locality and age groups. The higher figure more nearly characterizes older groups of chicleros and embraces all degrees, states and sequelae of Leishmaniasis. Apart from occasional epidemics, it is unlikely that more than 10% of the chicleros in any camp will present active and severe lesions and of any such number relatively few will be totally incapacitated for work. No less, the frequency and severity of this occupational disease warrants earnest effort toward its control.

From present knowledge of this parasitic disease, it is scarcely conceivable that under any condition it may arise in the United States in connection with the chewing gum industry as a result of the inclusion of infectious material in raw chicle or its covering material. Neither the consumer of chewing gum nor the workers engaged in the purification of chicle nor the manufacturers of chewing gum should suffer any apprehension over the possibility of transference of this disease from the jungles to the United States through the medium of chicle itself.

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Cancer as Accidental Injury

—Under the Workmen's Compensation Act—

I. H. RUBENSTEIN,
of the Chicago Bar, and
MORTON S. LEVY, LL.B.

DESPITE the fact that medical science is not at all certain of the actual cause or causes of cancer, the law, as to whether cancer is an "accidental injury" under the several workmen's compensation acts, seems well settled. A review of the leading workmen's compensation cases which involve cancer, reveals that these cases may legally be divided into two types. In the first type of case, it is claimed that the injury *caused* the cancer which brought about the resultant disability or death of the injured workman; while, in the second type of case, it is claimed that the injury *aggravated and accelerated the pre-existing cancer.* The essential difference between these two types of cases is that in the first type, the cancer is (apparently) non-existent before the injury occurred; while in the second type, the cancer is definitely known to exist before the injury happened.

Because of this particular difference, existing between these two types of cancer compensation cases, there is a general rule of law applicable to each. In the first type of case, the law is that where "a normal healthy individual receives an injury by accident in the course of and arising out of his employment and thereafter his health steadily declines and a cancerous condition in the vicinity of the injury thereafter causes the (dis-

ability or) death of the employee, the causal connection between the injury and the cancerous condition is established and the (disability or) death is compensable under the workmen's compensation act, on the theory that the cancer was caused by such injury."[1] A condensation of this ruling reveals that in order to prove that cancer is an "accidental injury" under the workmen's compensation act in the first type of case, the following four elements must be present in each case:

(Injury *Caused* the Cancer)

1. Serious injury or strain.
2. Physical causal connection between the injury and the disability or death.
3. Proper lapse of time between the injury and the disability or death.
4. Employee free from cancer at the time of the injury.

The following workmen's compensation cases illustrate the application of these four elements in determining whether the injury caused the cancer:

An employee cut his lip on the edge of a flap of an envelope, and cancer developed. Compensation awarded. All elements present.[2]

While opening an oyster, a blister on the employee's hand broke. Soon blood poisoning set in which caused cancer to develop from which the employee died. Compensation granted. All elements here.[3]

While striking a piece of hot iron, a blacksmith was struck by a piece on his sore lower lip, causing a blister to form. Later, the sore developed into cancer which caused his death. The medical testimony failed to show that the lip burn caused the cancer. Compensation denied. Elements 2 and 3 are absent.[4]

While carrying a large poster down the aisle of a theatre, an usher twice bumped his leg hard against a seat. His injury forced him to stop working, and soon developed into a traumatic sarcoma. Shortly thereafter, he died. Compensation allowed. All elements present.[5]

While unloading a box from a truck, it fell and caused a bruise to the laborer's side. From that day until two years later, he was under constant medical care. The medical testimony was that a sarcoma just below the bruise caused his death. Compensation awarded. All elements here.[6]

While helping to lift a heavy weight, the foreman slipped and severely strained his back. The pain soon forced him to give up working and six months later he died of a lymphatic sarcoma which had developed on his back. The medical testimony showed that the sarcoma was the result of the strain of the muscles of the back. Compensation granted. All elements present.[7]

While attempting to lift a coal car back on the track, a miner severely strained his stomach. Four months later, he died of cancer of the bowels. The medical evidence revealed that the miner had cancer of the intestines which could not have been caused by a strain recently received, but was the growth of two or three years. Compensation denied. Elements 2, 3 and 4 absent.[8]

An electrician fell off an electric pole. He was disabled for one month, and then returned to work. Two years later, he died of cancer of the colon. The medical testimony was that this type of cancer could not be caused by such an injury. Compensation denied. Elements 2, 3 and 4 absent.[9]

As a result of a fall from a log, an adjuster bruised his ankle. One year later, he developed a metastasis on his pelvis which deposited itself on his lungs and caused his death. Compensation denied. Elements 2 and 3 absent.[10]

IN THE second type of case, the law is that if pre-existing cancer is the lone and sole cause of the disability or death of the injured workman, then there is no liability for workmen's compensation; but where the injury directly aggravates and accelerates the pre-existing cancer, and the injury materially contributes to speed the progress of this disease to its culmination in disability or death, then there is liability for compensation.[11] A restatement of this rule reveals that in order to prove that cancer is an "accidental injury" in the second type of case, the following four elements must be present in each case:

(Injury *Aggravated and Accelerated the Pre-Existing Cancer*)

1. Ordinary type of injury.
2. Physical causal connection between the injury and the disability or death.
3. Proper lapse of time between the injury and the disability or death.
4. Employee suffering from dormant or active cancer at the time of the injury.

The following workmen's compensation cases illustrate the application of these four elements in determining whether the injury aggravated and accelerated the pre-existing cancer:

While delivering milk to a cafeteria, a milkman was struck on the ribs by the handle of a heavy door. The blow knocked the wind out of him. A week later, the pain caused him to see a doctor. The medical testimony was that this bruise aggravated the milkman's pre-existing cancer and caused his death five months later. Compensation awarded. All elements present.[12]

While making an arrest, a policeman was violently assaulted and injured in his abdomen. The injury caused considerable pain. Shortly thereafter, he died of cancer of the stomach. The medical testimony was that the injury aggravated his pre-existing cancer. Compensation allowed. All elements here.[13]

A woodworker was furrowing 100-pound posts against the knives of the furrowing machine by forcibly pressing his abdomen against each post. After finishing 13 of these posts, he suddenly sat down in great pain. There was a large bruise on his abdomen. The evidence tended to show that he died from an internal rupture and cancer. Compensation granted. All elements present.[14]

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1. *Smith* v. *W. P. Lumber Co.*, 53 Idaho 808, 27 Pac. (2) 965 (1933).
2. *Ind. Com.* v. *Globe Indemnity Co.*, 74 Col. 52, 218 Pac. 910 (1927).
3. *Vanderslice* v. *Young*, 235 N. Y. 574, 139 N. E. 740 (1923).
4. *W. S. Coal Co.* v. *Ind. Com.*, 321 Ill. 61, 151 N. E. 593 (1926).
5. *Ascher Bros.* v. *Ind. Com.*, 311 Ill. 258, 142 N. E. 488 (1924).
6. *Smith* v. *P. Tapestry Co.*, 285 Penn. 145, 131 Atl. 703 (1926).
7. *Simpson* v. *Ind. Com.*, 337 Ill. 454, 169 N. E. 225 (1929.)
8. *C. Coal Co.* v. *Ind. Com.*, 303 Ill. 415, 135 N. E. 753 (1922).
9. *Amos* v. *Village of Bradshaw*, 128 Neb. 514, 259 800 (1935).
10. *Halleck* v. *Hartford A. & Ins. Co.*, 75 Fed. (2nd) N. W. 374 (1935).
11. *Simpson* v. *Ind. Com.*, supra.
12. *Shepard* v. *Carnation Milk Co.*, 220 Iowa 466, 262 N. W. 111 (1935).
13. *Gaetz* v. *City of Melrose*, 155 Minn. 330, 193 N. W. 691 (1923).
14. *Voorhees* v. *Shoonmaker Co.*, 86 N. J. L. 500, 92 Atl. 280 (1914).

While working under an automobile, a wrench slipped from the mechanic's hand and struck his eye. The medical testimony was that the mechanic had a dormant glioma, which was wakened up by the injury, and which caused his blindness. Compensation awarded. All elements here.[15]

A still in a chemical plant expioded throwing an employee a distance of 30 feet, and causing a bruise on the left side of his face. A few days later, the pain increased, and the ailment was diagnosed as a carcinoma of the cheek. Six months later, the cancer caused his death. The medical testimony was that the carcinoma was aggravated by the injury. Compensation allowed. All elements present.[16]

A miner had a small cancerous lip sore. While working, the lip sore was injured by a fragment, causing it to bleed and to become rapidly worse until it soon caused his disablement. Compensation granted. All elements here.[17]

While rolling a log, a boom boss slipped and fell under the log, and severely injured his crotch. The medical testimony was that the injury aggravated a pre-existing cancer in his prostate gland, and was the cause of his death. Compensation awarded. All elements present.[18]

While working in a sewer, a flood carried the laborer a short distance away. The only injuries he sustained were slight scratches to his face and forehead. Five months later, he died of cancer of the neck. The medical testimony was that prior to the injury, the laborer suffered from an extensive cancer of the mouth. Compensation denied. Elements 1, 2 and 3 absent.[19]

Employee fell into a pit, a distance of 15 feet, down on a cement floor, and received a fractured femur and ulna. After two months' hospitalization, he complained of stomach trouble which was diagnosed as cancer which caused his death. The medical testimony was that this cancer was a "leather-bottle" cancer and that it existed before the injury and was not affected by the injury. Compensation denied. Elements 2 and 3 absent.[20]

IN CONCLUSION, it must be pointed out that a complete review of the cases which have been considered in this article reveals that certain cancers, because of their peculiar type and particular location in the human body cannot be *caused* or *aggravated and accelerated* by an injury, blow, bruise, strain or cut, and hence disability or death caused by such cancers is not compensable under the workmen's compensation act, despite the fact that severe trauma was present.[21]

Immobilization of the Thorax

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THE methods used to immobilize the thoracic cage have proved rather disappointing, as evidenced by the numerous procedures which have been devised and described in the literature in the past few years. The technic generally in use of encircling two-thirds of the periphery of the chest with adhesive strips is objectionable for a number of obvious reasons:

1. Men must be shaved.
2. Women offer difficulty because the intertriginous portion of the breast is very easily irritated, especially in the pendulous types.
3. Excoriation is common after a few days of application of the adhesive strips upon the skin.
4. Removal of the tape is unpleasant and often painful, and its replacement causes additional excoriation.
5. The immobilization is not effective because the adhesive slips upon the skin, due to perspiration and body heat.
6. It is impossible to administer heat therapy to the chest without damaging the splint, rendering it useless and messy.

We believe that the entire principle of the attempt to lessen the excursion of the ribs by relying upon the application of a two-thirds coverage of the thoracic periphery with adhesive tape is irrational and does not take into account the topographic anatomy of the thorax. The application of adhesive strips directly upon the skin is ineffective. The act of inspiration expands the chest and causes a pull on the long or horizontal axis of the strips, and even if the adhesive undersurface should not slip, the remaining third of untaped skin is elastic enough so that it renders the method almost worthless.

To keep the chest from expanding one must encircle the cage *entirely* with a non-elastic band. Recent innovations by Hammond[1] and Waugh[2] indicate the effort to provide greater comfort, and the growing conviction that not two-thirds but the entire chest must be strapped to obtain adequate immobilization. Waugh devised a "Sam Browne" type of belt of plaster of Paris bandages; Hammond's belt is a six-inch web corset reinforced with steel stays.

The method here described has been employed during the past few years.[3] First used for a fractured sternum, it proved surprisingly comfortable and effective. It is ideal for immobilizing the thorax for rib fractures and pleurisy. We have employed it also as a splint for the thorax after skin grafts and the removal of costal cartilage grafts. It is simple, does not consume time, and affords comfort to the patient. It requires no special equipment or material, which makes this method especially suitable for injuries sustained in industry.

TECHNIC: First the thorax is powdered thoroughly with talcum. The patient slips into an undershirt. Tubular knitted ones are good, but any type may be used. Snugly fitted garments are best. If the garment is a little loose, it may be folded snug with a vertical fold of the cloth near the spinous processes. Underwear with buttons may be used but the buttons near the xiphoid or lower sternum should be removed. After the removal of these buttons, we use a few small strips of adhesive tape to keep the underwear edges neatly together, edge to edge.

The adhesive strips are about three inches wide

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15. *Pfeiffer* v. *N. D. Work. Comp. Bd.*, 57 N. D. 326, 221 N. W. 894 (1928).
16. *Whittle* v. *Natl. Chemical Co.*, 266 Penn. 356, 109 Atl. 847 (1920).
17. *Sepsi* v. *Pittsburgh Coal Co.*, 174 Atl. (Penn.) 590 (1934).
18. *King* v. *M. Paper Co.*, 224 Mich. 691, 195 N. W. 812 (1923).
19. *Palumbo* v. *City of St. Paul*, 187 Minn. 508, 246 N. W. 36 (1932).
20. *Slack* v. *Percival Co.*, 198 Iowa 54, 199 N. W. 323 (1924).
21. *Tassi* v. *H. Fish Co.*, 56 S. W. 2nd (Mo.) 797 (1933); *Amos* v. *Village of Bradshaw*, supra; *Slack* v. *Percival Co.*, supra; *C. Coal Co.* v. *Ind. Com.*, supra.

and long enough completely to encircle the thorax and overlap several inches. The tape is strapped horizontally *over the underwear* during full expiration, depending upon the comfort of the patient. The lowest strip is applied first, and each strip overlaps the preceding one by about half its width. A few longitudinal strips insure against rolling of the edges. The edges need not be parallel; one should seek rather to obtain close approximation to the individual contour. Strapping five or six inches wide is sufficient. Talcum powder may be sprinkled under the garment from time to time to overcome the discomfort of perspiration. Usually one application of the adhesive strips suffices. The splint may remain in place until the lesion, whatever its nature, is healed.

This technic is based upon the premise that to immobilize the chest it is necessary to inhibit costal breathing, and the best way to accomplish this is to restrict the expansion of the lower ribs. This can be done effectively only by having the restrictive tapes *completely encircle* the chest. Graham,[4] commenting upon the author's first description of this method, agrees that the upper ribs move so slightly that it is seldom necessary or advisable to apply straps to them. The functional anatomy of the thoracic wall is such that immobilization of the lower ribs inhibits the excursion of the ribs above.

The administration of infra-red, direct heat and short wave diathermy, of recognized benefit for conditions which require immobilization, is not interfered with by this method.

SUMMARY: 1. A method of immobilizing the thorax is described.

2. It does not require re-application.

3. Shaving is unnecessary.

4. The straps, applied over the undershirt, do not slip.

5. There is no pull on the skin.

6. Excoriation is eliminated.

7. The axiom that only the lower ribs need be strapped to immobilize the thorax is anatomically logical.

8. Thermotherapy can be utilized with the splint.

9. Special materials are not required.

10. The method is ideal in industrial surgery.

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3. BROWN, ADOLPH M.: A Method of Immobilizing the Chest. *J. Bone & Joint Surg.*, July, 1936, p. 787.

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Silicosis and Tuberculosis

M. CONROZIER *and* J. MAGNIN,
La Medecine du Travail, 10, 5:237-248 (September) 1938.
TRANSLATION AND ABSTRACT BY
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THIS article concludes a prior one entitled "Silicosis—Case Reports" published in the March, 1939, issue of INDUSTRIAL MEDICINE, pages 114-120.

The authors refer to the vigorous controversy going on between the two French schools, added to by the recent publication of the book, "Fibrose Pulmonaire des Mineurs," which concludes that all silicosis has a tuberculosis background. The present authors adhere to the opposite interpretation made from the same facts and report many of their own cases to substantiate the autonomous nature of silicosis.

The authors state that the high prevalence of tuberculosis claimed by their opponents may be consequent upon difference in geographic location and the marked extent to which alcoholism exists in their opponents' territory, also the inferior status of mine sanitation. Among their opponents' miners, decreased weight is noteworthy, whereas in the Gard Basin the men are a vigorous class and maintain their weight, while alcoholic consumption is minimal, community tuberculosis is rare, and marked silicosis occurs in the prime of life. In only three cases among 42 silicotics examined in the past year have tuberculosis organisms been found, and two of these came from a gold mine in another locality, Angers. The most advanced of the silicotics in the Gard Basin were investigated by sputum-guinea pig inoculations which gave positive tests for tuberculosis in only one or two cases.

They ask why siliceous dust should be forgotten when it concerns the causation of silicosis but called to the fore when it is desired to emphasize its retarding effects on the search for the bacilli; and what of the thesis that pulmonary tuberculosis should always be proved by the microscope? They point out, accordingly, that silicosis should be rare whenever tuberculosis is rare (which is just the opposite in the Gard Basin). Thus they have found one case spitting the bacilli in about 40 of their own men, and know no more than six cases in eight years classed as tuberculous.

The Academy of Medicine did the authors the honor to send a delegation to whom were shown 20 well-developed silicotics, none of whom was spitting bacilli. A large number of radiographs were shown them. Although two years have passed, during which an official report ought to have been made, none has been forthcoming.

It is untenable to assert that silica has modified

the tuberculosis picture so that the latter cannot be verified in the laboratory, since such does not explain the pronounced bilateral character of the pulmonary lesions which are further characterized by chronic pathology, all easily explained as the effects of silica alone. A mass of clinical facts also bespeaks the same interpretation. They point out that when the dust was suppressed among the grinders in Sheffield (England) silicosis disappeared completely. The same has been true with the Gard miners, and recently in certain German mines and very pronouncedly in the Transvaal. It has not been possible as yet to be so thorough in the Gard mines but, in the Transvaal, the incidence of silicosis decreased five or six times.

Up to recent years there has been an extreme frequency of bilateral pneumopathology in the rock miners in the Gard Basin, following which, notable diminution has occurred where the dust was controlled. Now they are not seeing, with one exception, cases similar to those they published several years ago. There has been dust everywhere but, practically speaking, they have never seen tuberculosis.

They insist that too much attention is given to laboratory experiments on guinea pigs or damaged lungs studied under the microscope following injected suspensions. Such is not seen in the pneumopathology of the Gard miners. The controversy could be extended indefinitely between those who study the living and those who study the dead.

BY GOOD fortune, the authors have had the opportunity, in the past three years, of following 20 miners permited to work after pre-employment examinations, and controlled radiographically twice a year. Their chests were found free of characteristic lesions at the end of the period. They had been put to work where water was used, which greatly reduced the density of the dust. As a consequence during the first year, no functional disturbances were observed and the pulmonary pictures remained scarcely modified. The same was true in the second year. In particular none was dyspneic. But it was incontestable that certain of them were beginning to show fibrosis. The third year distinctly confirmed the extension of the fibrous lesions which had appeared in the preceding year. By the end of the third year some of these miners were showing dyspnea and considerable fatigability. They were advised to quit work on hard rock for at least a year. None of these workers showed any nodular pictures. Opportunity has not yet been had to wait for the stage of confirmed silicosis (nodulation) but, on the contrary, it was decided to stop their work on the rock before the appearance of nodular invasion. This study has produced indisputable evidence of a beginning fibrosis due solely to the action of rock dust on human beings under the exact conditions of their work environment. Radiographic evidences of these changes will be given special attention in a later publication.

While these patients have not been allowed to go on to nodulation, the authors have other observations which fill in the gap between simple silicosis and discrete nodulation. Their collection shows x-rays of fibrosis along with distinct nodulation. For example, one vigorous worker (P), 29 years of age, who was examined for his capacity for work at the end of four years, during three years of which he had worked elsewhere in dry mines, showed a very definite picture of fibrous silicosis with nodules. He was consequently interdicted from further exposure to rock dust. Despite this, this splendidly musculatured young man has been dyspneic upon effort for the past four years and less capable of laborious work. Several laboratory examinations of his sputum and its inoculations into guinea pigs have shown the absence of tubercule bacilli.

THE authors have numerous cases of more advanced stages, of whom one miner (A1) is an interesting case. He was brought in for estimating his capacity for work on the rock. He was a vigorous subject with a large chest and without apparent dyspnea but showed a radiographic picture of only lightly dense, but typical nodular, silicosis. They refused to authorize his continuing at work which, within five years, had so fibrosed his chest. However, they were too late. He proved to be an evolutionary silicotic, or one with rapid progress. He died recently from progressive asphyxia after showing radiographic pictures filled with confluent nodules, and after having had many sputum tests with several guinea pig inoculations with negative results. They consider that the lives of victims are endangered by the appearance of primary nodules.

Not satisfied with the above observations, they again carefully re-examined all of their miners who could be found (they have reported upon 130). Two had died. Some were wanderers and a few belonged to migratory groups of pit-workers who could not be contacted, but the great majority were found and examined. All of these insisted upon the excellence of their health before the appearance of breathlessness, and insisted that shortness of breath was the only indisposition which they had suffered, many of them for a long time. Some had been dyspneic for 20 years, with health and weight intact. The average one describes himself characteristically thus: "At that time I could walk. The following year I could not walk more than 100 meters; after that I stopped every 10 steps; then I could no longer climb stairs; next I sat around for some years; (now) I am constantly short of breath." Yet during all of these years, they have maintained an appearance of vigorous health, altogether out of proportion to their terrible dyspnea—a progressive drama, which is for them "the search for air," which they inhale with open mouth, chest elevated, neck retracting into the shoulders, larynx drawn down to the chest. But they do not expectorate tubercle bacilli.

More rare are those who die sooner but none the less dyspneic, and it is clearly not superimposed tuberculous infection which suffocates them, but dust fibrosis.

The authors agree that silicosis is very easy of diagnosis as compared with other occupational diseases.

They invite those interested to spend 48 hours in the Gard Basin where they will be shown inactive, nodular cases which have held out for years and who still work at the bottom. Also other massive forms, such as the case (D), followed for nearly two years, with enormous lesions and extreme dyspnea, but never exhibiting tuberculosis even with guinea pig inoculations, who has survived three years but, during this last year, has developed pulmonary congestion necessitating oxygen in large amounts. Or, another man who is still working daily at the bottom with fibrous masses involving each hemithorax.

The question is asked whether tuberculosis could explain why silicosis is always bilateral and symmetrical, as occurs in their cases, where the occupational character is perfectly obvious. They point out that pulmonary tuberculosis of the adult, as reawakened from a childhood type of infection, is always unilateral on first appearance in chronic forms of the infection, and often remains unilateral for a long time. In fact, artificial pneumothorax and the various types of modern surgical intervention are based precisely upon this unilateral localization. Yet they do not know of a single case of silciosis which was unilateral for even a short time.

Inquiring visitors will also be invited to test out cellular sedimentation. The authors have already done this upon a few cases, especially those with extensive lesions. One marked case (Loy) showed a sedimentation of only 10% which is very little beyond normal, whereas a bilateral tuberculosis with grave lesions would show a figure of 40 to 70%. Hence, from the laboratory viewpoint, this sedimentation test, which is acknowledged to be especially sensitive in the case of tuberculosis, bears out the authors' conception.

Even when tuberculosis is found as the result of alcoholism, macroscopically or microscopically, including infection tests, it very often occupies an isolated region in the lungs which, everywhere else, show lesions of pure silicosis. Although Bohme, of Bochum, finds lesions of tuberculosis at the rate of 70% in his silicotics, such does not deter him from considering silicosis as an industrial malady. To the authors, tuberculosis in silicotics plays about the same role it does in diabetes; that of a tardy complication without any relation to the origin of the malady.

The authors state that it is only in France that there is opposition to the recognition of silicosis as such. Even though tuberculous lesions have been firmly established in autopsies on silicotics, as in Germany, the Transvaal, and England, investigators in these countries are not opposed to the idea that silicosis be recognized as an autonomous malady.

The question is asked: What extensive background of repeated irritation of the lungs by dust is not contributory to tuberculosis? Likewise, why should universal pulmonary tuberculosis be diagnosed in cases at autopsy which show only pure fibrous lesions alongside those of tuberculosis? Is it maintained that these fibrous lesions are tuberculous lesions? Vigorous young rock miners acquire silicotic fibrosis the same as a large number of war-gassed cases have shown fibrosis without tuberculosis. Even if certain of these eventually die with tuberculous lesions, the initial responsibility of dust or gas still remains.

Since silicosis disappears where the dust is suppressed, this justifies the tenacity of the dust doctrine upon which depend the lives of numerous miners. If, on the contrary, the problem of silicosis is essentially the problem of tuberculosis, then the task of furnishing effective aid to the afflicted rock miners may be delayed until the next century. It would demand the attacking of slums, pulling down whole quarters of old cities in an endeavor to establish extensive sanitary improvements, and waging a real battle against alcoholism. It would be necessary to expend billions.

However, it is simple and easy to solve the problem of silicosis and to do it immediately and at hardly the cost of a ton of coal. Present day scientific knowledge has reached a point which permits the practical total suppression of dust. Indeed, certain German mines go as far as the affectation of white clothes for visitors. The exhaustion of dust at the point of the drill has been amply realized by the use of water-gauged foam, a universal decree against dust and for wetting down surroundings. Why this is not done is curious.

At the same time nothing is lost by correlating the battle against dust with medical surveillance of the workers. Drillers ought not to be hired by law without preliminary radiography of the chest, and it should be declared obligatory to examine all rock miners semi-annually, with radiographic control.

Such does not place any impossible burden upon the coal mining companies, and, as it would appear quite probable that some day reparation for such invalidity will be decreed, it follows that this obligation will amount to financially nothing—silicosis having disappeared.

From the Archives

AS EARLY as 1897 systematic eye protection was in operation in the plant of the Crane Company of Chicago.* At that time this company began to provide eye protectors for its men.

"In 1898 the work was put on a systematic basis. Safety glasses were given to the men free of charge, and operators were required, as far as possible, to wear the glasses constantly when they were exposed to flying bits of metal, emery dust. to glare and to hot metal.

"Dr. A. M. Harvey, the Chief Surgeon of that company, was the originator of this plan of providing glasses for the men. The fact that since the company began to provide glasses eye injuries have been cut down to an extremely low point

* *Chicago Daily News*, July 13, 1915.

proves the value of having workmen protect their eyes in the shops.

"The Crane Company posted signs conspicuously at various points in the shop drawing the attention of the men to the necessity of using glasses and the fact that the glasses were provided by the company free of charge."

Central States Society

—Proceedings of the Twentieth Annual Meeting, Rockford, Illinois, May 2, 1939—

THE Twentieth Annual Meeting of the Central States Society of Industrial Medicine and Surgery was held, in conjunction with the Illinois State Medical Society Meeting, at Rockford, Illinois, May 2, 1939. The following program was presented:

"Further Studies on the Application of Bone Plates," WILL F. LYON, Chicago. Discussion, JAMES J. CALLAHAN, Chicago.

"Regional Anesthesia in Traumatic Surgery," EMERY B. NEFF, Moline. Discussion, JAMES J. VALENTINE, Chicago.

"Function Reflections of Organic Disease as Seen in Industry," LEROY H. SLOAN, Chicago. Discussion, ROLAND P. MACKAY, Chicago.

"Practical Tests of Functional Capacity in Silicotics," ELSTON L. BELKNAP, Milwaukee. Discussion, JAMES A. BRITTON, Chicago.

"Trauma in the Etiology of Peptic Ulcer," CHESTER C. GUY, Chicago. Discussion, GEORGE L. APFELBACH, Chicago.

"State of the Nation," President, WILLIAM C. GOENNE, Davenport, Iowa.

"Treatment of Compound Fractures," CARLO S. SCUDERI, Chicago. Discussion, ELLSWORTH BLACK, Jacksonville.

"Fractures of the Elbow," RUDOLPH J. MROZ, Rockford. Discussion, EDWIN M. MILLER, Chicago.

"Pin Fixation of Fractures of the Neck of the Femur," WILLIS J. POTTS, Oak Park. Discussion, JAMES STACK, Chicago.

"Operative Treatment of Fractures," PAUL B. MAGNUSON, Chicago. Discussion, WILLIAM R. CUBBINS, Chicago.

Morning Session

THE morning session pertained to miscellaneous subjects and was presided over by DR. WILLIAM GOENNE, President of the Central States Society. In the afternoon, the session was a joint one with the Surgical Section of the Illinois State Medical Society and both DR. GOENNE and DR. DARWIN KIRBY, Chairman of the Section on Surgery, Illinois State Medical Society, presided.

DR. WILL F. LYON first called attention to Dr. Frederick Cotton's postulate—don't operate on fracture if satisfactory results can otherwise be obtained by you or someone else. It is admitted that a great deal of skill and ingenuity is involved in the use of bone plates, but it is a question as to whether bone plates deserve all the ill repute ascribed to them. Dr. Lyon divided fractures into four groups: (1) those which are satisfactory without reduction (occurring mainly to skulls, backs, pelvis, hands and feet), 55%; (2) those requiring reduction and which stay put with ordinary splinting, 25%; (3) those which require skeletal traction during the healing period (principally diagonal or comminuted fractures) 15%; and (4) those in which open reduction must be used in order to get satisfactory results and in which a metal plate may be satisfactorily used for immobilization, 5%. Engineers say that the principles of plating a fracture are sound mechanically. We can then assume that most failures come from improper technique. It is important to remember that plates and screws must be placed subperiosteally. Metals should be non-irritating and non-corrosive. A historical resume of the experience of Sherman in the introduction of vitallium steel and screws was given. Vitallium (65% cobalt—30% chromium—5% molybdenum) has a number of favorable characteristics: it is hard and strong, but not brittle—it is non-tarnishing—and it can be welded. The work of Venable on the electrolysis of metals was summarized, including a summarization of experimental work done on dogs with vitallium. There is one objection to vitallium; it is so hard it cannot be machined, therefore screws must be cast. The so-called "18 to 8" stainless steel is non-tarnishing and gives no reaction in the tissues after many years. It is essential to realize in considering the mechanics of using bone plates, that you can improve on the plates and the screws, but you can do nothing about the texture of the bone. Hawley's angle iron has improved our technique some. A demonstration was given of a machine for testing the force needed for pulling screws out of bone, making use experimentally of animal bones of different kinds. This demonstration showed that it took 270 pounds and 350 pounds respectively to pull screws out of bones; incidentally the bone is always damaged when this happens. The holding power of a screw naturally depends on the thickness of the cortex which must be measured by a special device. Only the Sherman screw has been assigned the correct drill size. It is, therefore, necessary that experimental work be done on the size of screws and drills, and the speaker hoped to prepare a table on this sometime. A series of lantern slides was shown of various types of fractures and comments made with reference to the use of plates and also with reference to not using such devices. In conclusion, the following points were emphasized: (1) strong plates of non-corrosive metal with no electrolytic reaction should be used; (2) correct sizes of screws and drills must be properly chosen and used; (3) holes should be centered; (4) screws should be long enough to engage the opposite cortex; (5) screws should be snugged down but not be made excessively tight.

DR. JAMES J. CALLAHAN, in discussing DR. LYON'S paper, stated that he had not had experience with vitallium, as it was too expensive. He was also of the opinion that chromium might cause poisoning. He re-emphasized the importance of pierc-

ing both cortices. Murray has recently used metal entirely in this type of work. DR. CALLAHAN was partial to screws because of better holding and because plates might hold bones apart, which is not true with screws. It was his belief that such results were responsible for so many non-unions.

DR. EMERY B. NEFF presented a review of "Regional Anesthesia in Traumatic Surgery." Regional anesthesia is not used as much as it might be. Obviously a knowledge of the peripheral nerve supply and a proper quantity of anesthetic properly placed is necessary to good results. The objections which have been made to the use of regional anesthesia are inadequate anesthesia (probably due to lack of proper knowledge); sloughing of tissue (probably a technique fault); postoperative infection (probably due to improper choice or use of disinfecting agents); local reaction; and general reaction. The essayist has found that procaine was an adequate anesthetic agent. There is little advantage in the use of epinephrine except in prolonged anesthesia. An additional cause of tissue necrosis is the improper use of a tourniquet—which is not really necessary at all. If proper technique is observed and ordinary care is exercised, there is no reason why infection should occur. Occasionally there is a local allergic reaction, probably due to the antiseptic and which the author believes has been greatly exaggerated as to its importance. A general reaction usually follows the injection of an anesthetic into the blood stream. Regional anesthesia is especially valuable in industrial surgical work, for fractures and for injuries around fractures, especially favoring the relaxation of muscles. An advantage is that a great deal of time is saved and further, the procedure can be used on persons who are not good subjects for a general anesthetic. In summary, a plea is made for renewed interest in regional anesthesia and its specific use in industrial surgical problems, where it can be adapted so readily and efficiently.

DR. JAMES J. VALENTINE, in discussing the paper of DR. NEFF, felt that epinephrine is of value in helping to retard absorption of the anesthetic. Regional anesthesia is certainly the procedure of choice in many fracture cases. Naturally the type of case determines which variety shall be used and there are no rules.

DR. LEROY H. SLOAN presented an interesting group of case history pictures, in discussing "Function Reflections of Organic Disease as Seen in Industry." Many others have differentiated hysteria, traumatic neuroses, and malingering. Reference was made particularly to Freud's "conversion hysteria." In traumatic neurosis, complaints are multiple and there is a general diffuse picture; malingering is conscious and there is fabrication for financial reasons. After skull fractures, we have what are known as immediate and late sequelae; there is often an effect on the opposite side from edema, after a middle meningeal hemorrhage. A subdural hemorrhage may give rise to the same picture, confusing symptoms, and a decision to operate on the wrong side. A pupil dilated and fixed indicates that there is hemorrhage on the same side. The late sequelae give the most trouble. Cortical atrophy is also a problem and gives rise to disability. Unless hysteria, traumatic neurosis, or malingering are established, disability is quite likely due to traumatic influences. A case of acute retention was followed by nystagmus, tremor, unsteadiness of gait, and increased tendon reflexes. This was a puzzling case in its clinical aspects until the diagnosis of multiple sclerosis was made. In some instances, these cases are extremely puzzling for the reason that the first sign of anything wrong cannot be connected with other signs or symptoms and, further, there is an intermittency in the symptomatology. For example, a baseball pitcher suddenly threw the ball at right angles to where it should have been thrown; there was no trouble for a period of five months; then he was troubled by constipation and bladder symptoms; again there was an intermittent period of five months without symptoms; he then had difficulty in walking; the examination showed nystagmus, tremor, temporal pallor of the discs, which resulted in a diagnosis of multiple sclerosis. In a factory employee who suddenly "hauled off to strike" his arm was apparently suddenly paralyzed; he developed a narcolepsy and his family thought he was crazy; administration of glycine and gelatine made, however, a great deal of difference in this case. In a case of myasthenia gravis, there was constantly a pain down the arm—there was a history of injury but this seemed insufficient; his teeth and tonsils were taken out, but he became worse; observation showed one pupil half the size of the other and the eye sunken in and the lid pulled down; this proved to be a carcinoma involving the brachial plexus and a carcinoma of the upper portion of the lung. An engineer bent over in the course of his work and immediately sank to the floor; it was found that he was paralyzed in one leg and had lost sensation to pin prick; further diagnostic procedures proved this case to be an aneurysm of the cord. A patient with arthritis and flat feet had previously complained of numbness several years before; no nerve changes were noted; little by little the numbness increased and there was loss of Achilles reflex and sensory perception; later examination disclosed compression of the spinal cord due to an extrusion of an intervertebral disc; operation involving removal of the disc permitted complete recovery.

DR. RONALD P. MCKAY, in discussing DR. SLOAN'S presentation, stated that it was difficult to differentiate emotional disturbances and organic disease. Many times the patient suffers from a fear of the lesion. Invariably there is an emotional reaction anyway and such a reaction shouldn't always be labeled hysteria. Emphasis was placed on the post-traumatic headache and vertigo syndrome (postural vertigo and headache). A great many of these types of patient do a lot of medical shopping and finally are very resentful; such a condition may proceed to both organic and emotional disturbances. Vasomotor and humoral changes in the labyrinth often cause difficulty.

DR. ELSTON L. BELKNAP presented "Practical Tests of Functional Capacity in Silicotics." In conducting a series of functional tests on persons with second stage silicosis, not complicated by active infection, it was found that the reserve capacity was great, and further that the pulmonary reserve was ordinarily not affected in the second stage of silicosis. Disability in this instance means work disability. In Wisconsin, disability means actual wage loss. Five tests were used, it being found that in a series of 100 men with second-stage silicosis, all were normal in one or more of such tests: (1) *chest expansion* (two to four inches with a low normal of one and a half inches); (2) *breath holding* (30 to 60 seconds with a low normal of 20 to 25 seconds); (3) *exercise test* (after walking up 50 steps in 30 seconds, the pulse and respirations should return to the initial reading after two minutes rest); (4) *vital capacity* (70 to 100% with a low normal of 65%); and (5) *diaphragmatic excursion* (40 to 60 mm. with a low normal of 30 mm.). A control group of 90 non-silicotics was also used in these tests. As to the details of the results, 55 to 59% of the second stage silicotics showed normal chest expansion, breath holding, vital capacity, and exercise test readings, while 92% showed normal diaphragmatic excursion. All cases in the group were normal by one or more of the five tests, and 66% were normal in two or more tests. Lantern slides were given, showing various findings in different cases, quite a number of such instances showing obvious cardiovascular disease. Such diseases as angina, high blood pressure, asthma, fibrous tuberculosis are extremely important in differential diagnosis in estimating disability. In summary, if the subject shows obvious dyspnea, one must rule out cardiac disease, obesity, and similar conditions which affect the rate of respiration; dyspnea is more likely to be due to non-silicotic pathology than to the effects of silicosis, in the second stage groups.

DR. CHESTER C. GUY discussed "Trauma in the Etiology of Peptic Ulcer." The question of trauma as related to ulcer is not common in the literature. For years the existence of a traumatic relationship has been doubted and is still doubted by some authorities — however, there is a possibility that there can be such a relationship. A summary of the medicolegal aspects was given. The acute pathology in peptic ulcer is due to a devitalized area and subsequent necrosis; an epigastric blow may produce tears, some of which do not heal promptly — such were the conditions in the Ustermann and Mayo cases. The postulates which the essayist established in reference to a traumatic relationship were: (1) hemorrhage in vomitus or stools; (2) external evidence of trauma; (3) symptoms of ulcer; and (4) absence of previous gastro-intestinal disorders. This has reference, of course, to acute types of ulcers, and the author believed that such ulcers have a traumatic basis in 1% to 2% of cases. The answer to the question as to whether traumatic ulcers may develop in the absence of direct injury to epigastrium is that it is a possibility, but it is rare. In relationship to chronic ulcer, the greatest difficulty comes when the typical ulcer picture of the chronic type is ascribed to an injury; it is believed, however, that such a relationship can exist in a small number of cases. The differential problem here usually resolves itself into showing that there is no evidence of an accident, no evidence of incapacitation, no evidence of hemorrhage, no evidence of external injury, and no true clinical picture. An instance of a fractured spine associated with ulcer was given. The question as to whether trauma could activate an ulcer is one of great difficulty; the answer, however, is yes, because of the severe contraction of the abdominal muscles during exertion. Of the Kessler postulates (1—Prove absence of previous disease. 2—Trauma must be severe and local. 3—Symptoms must follow immediately. 4—There must be a continuation of symptoms and signs) the author believes that the last three are reasonable. There have been court decisions on this question in Nebraska, New Jersey and Illinois, about which there is nothing unusual or precedental. The burden of proof obviously rests on physicians who assume that there is a definite relationship between trauma and ulcer—although it must be admitted that such conditions can occur.

PRESIDENT WILLIAM C. GOENNE closed the morning session by giving a historical review of the development of industrial medical and surgical societies, particularly with reference to the Illinois group and, later on, the Central States group. The importance of proper organizational work was stressed.

Afternoon Session

DR. CARLO S. SCUDERI, in discussing the subject "Treatment of Compound Fractures," stated that the treatment principles were old and well established. The discussion was intended to be a collection of experiences and should not be interpreted in any way as dogmatic; selection of treatment methods should be made possible. A comparatively large number of cases come in to the hospital service on Saturday nights. First aid by laymen is important, but they should be taught not to manipulate fractured bones — covering the wound and immobilization are the important points in lay first aid. The patient should be out of shock before hospital treatment is begun. In the essayist's experience, the patient is taken to the operating room and complete debridement is done under anesthetic, after the patient is properly shaved and washed while the wound is covered. The wound is also washed. When the patient is prepared with iodine and alcohol, these fluids are not put into the wound. The wound is extended surgically and exposed to sight, the skin edge not being removed unless injured. A thorough examination is made as to the injury to nerves and blood vessels and the wound is properly cleansed with salt solution. Skeletal traction or plaster casts are methods of choice in this work. In closing the skin interrupted sutures, and loosely ap-

proximated skin edges are used. Dressings are changed as often as three or four hours at first and, later, as often as necessary to keep the dressings dry and in proper condition. Vaseline gauze packs are not used. Results have shown up to 92% clean cases, under this type of treatment. The infected cases are treated with 2% urea solution of Dakin's solution. The principle for the removal of tissue is by the line of demarcation.

Dr. Frederick Slobe, in discussing Dr. Scuderi's presentation, said that it was wise to stick to the fundamentals in his discussion. He laid particular emphasis on the consideration of compound fractures as emergencies. Naturally, the kind, extent, and nature of the wound make a great deal of difference and have a great deal to do with the principles adopted in treatment. Copious and careful use of sterile water and soap for scrubbing and irrigation is availed of; debridement is done; then loose primary sutures are used. In a case of doubt or when debridement is not done, it is his custom to use delayed primary sutures. Plates and screws are used in carefully selected cases.

DR. RUDOLPH J. MROZ presented a paper on "Fractures of the Elbow." This type of fracture is seen by all surgeons, but has been a source of a great deal of worry because of the involvement of the joints in many instances. The importance of brief neurological examination was stressed, to check nerve injury if any is present. The anatomy of the elbow joint was reviewed in detail. It is wise not to forget that there are such structures as epiphyseal centers. Automobile accidents have been a large factor in causing fractures around the elbow joints. One way to avoid swelling or to control swelling to some degree is to accomplish immediate reduction under general anesthesia. In a simple classification of fractures around the elbow joint, those distal to the humeral condyles were mentioned, as well as supracondylar and those which involve the radius and ulna. Of these, the supracondylar is the most common. Ether is preferred as an anesthetic by the essayist. One must be careful of possible interference with the circulation by using too acute flexion in securing reduction. Immobilization is usually done in approximately 75° flexion. Adhesive is often useful. A posterior molded splint may be of considerable help. Both antero-posterior and lateral x-ray films should be taken. In three weeks gentle passive motion may be begun. Active motion must be started as early as possible, according to one's judgment in each case. Open reduction is not often necessary. Skeletal traction may be applied as an efficient procedure in these types of fractures. In a child, the immobilization period may quite likely be less than in an adult, and the prognosis is usually better in children. The outer condyle is more often fractured than the inner; slight immobilization for a period of about three weeks is usually efficient. If fragments appear to be very loose, open reduction may be the better procedure and one may also fasten the fragments with beef-bone screws. Normal use of the arm should not be allowed until the x-ray plainly shows union. Fracture of the head of the radius often offers a difficult problem and an open operation is often required; care should be taken for the radial nerve. In certain instances of threatened serious disability, the head of the radius may have to be removed. As a complication Volkmann's contracture may occur. It may be wise to aspirate hematomas. Usually tight bandages are contra-indicated. A series of slides was shown of fractures around the elbow in children, with a discussion of the types of fractures involved and the treatment which secured good results.

Dr. Edwin M. Miller, in discussing Dr. Mroz's paper, emphasized the importance of immediate care. Such cases are preferably treated in the hospital, under close observation. The injuries to the soft tissues must be well considered. Experience shows that the median nerve is more often involved than the others. Loss of radial pulse is liable to occur. A skeletal traction apparatus permitting traction in four directions has been found to be efficient for this type of fracture. Loose fragments if left alone atrophy and produce changes in the angle of the joint, as well as possible ulnar paralysis. The ulnar nerve may have to be transplanted.

DR. WILLIS J. POTTS discussed "Pin Fixation of Fractures of the Neck of the Femur." Mention was first made of the former era before Whitman and the use of the abdominal cast and the present era during which one uses the Smith-Petersen method. Ten cases were operated in 1937, accomplishing fixation by the use of Austin Moore pins. A number of slides were shown depicting various cases, those known as classical cases and others. In one instance a Smith-Petersen nail was used, after first using Kirchner wires. Another case was demonstrated which involved a dead head of the femur—later union was accomplished with some shortening. Another case of dead head of the femur went on to solid union after one year. A number of cases were demonstrated as occurring in old women, on which pins were used. Operations were on a regular table, using an S-shaped incision; the muscles were retracted medially, and the tensor fascia laterally; valgus position was used, the pins inserted and an x-ray taken.

A special technique for the taking of x-ray so as not to disturb the sterile field was described. Immobilization is the important need.

In conclusion, the following points were emphasized: (1) absolute immobility; (2) economy—three weeks as compared with three months; (3) comfort and improved morale; and (4) mortality lower than with other treatments because of freedom.

In the discussion of Dr. Potts' paper, emphasis was placed on opening the hip to see the results; this doesn't mean much more than to make a longer incision. Not all intracapsular fractures need to be pinned. Not all patients are intolerant of Whitman apparatus. A case of impacted fracture of the head was cited as being successfully

treated without surgical procedures, using only bed rest and general treatment principles.

DR. PAUL B. MAGNUSON presented the last paper of this meeting, on "Operative Treatment of Fractures." Previous experiences have given ample warning of the pitfalls that may be encountered in the operative treatment of fractures. As typical operative fractures, those of the head of the radius, ulna, head of the humerus and patella were mentioned. In fractures and dislocations of the head of the humerus, the dislocation should first be reduced and then operative treatment of the head accomplished—suture by wire or tendon may be the method of choice. Little resistance may be encountered if the arm is put into abduction. In the x-ray film, the head may look larger than usual due to roughening. The raising and lowering of the arm by overhead pulleys may be helpful in getting proper movements. Fracture avulsion of the greater tuberosity of the humerus may be treated after attempted reduction by suture of the fragments firmly in proper position and mobilization in abduction splint. In fractures of the ulna and dislocation of the head of the radius, if the radial head cannot be reduced and the ulna held in proper position, an open reduction is necessary. Fractures of the olecranon are simple and need no immobilization if properly treated; furthermore, there is no need for long disability. Sutures will hold better through ligaments rather than through cancellous bone. No cast need be applied. Aseptic technique must be rigid, it being best to do the draping one's self. In patellar fractures, the ligaments must be sutured and the tendons can be sutured together through the patella. A cast is not necessary. Motion and weight-bearing can be started when the wound heals. In fractures of both bones of the forearm, if proper reduction cannot be obtained, open operation should be done. In fractures of the radius, one should always be on the lookout for shortening and distortion of the wrist joint. Fractures of the neck of the femur of various kinds are perhaps better treated with open operations unless it is to the patient's disadvantage. In x-rays of fractured hips, lateral views are usually deceptive of the real conditions.

DR. JAMES A. JACKSON, in discussing the presentation of DR. MAGNUSON, said that the successful use of plates depends upon proper technique. The details of the preparation for operations should be closely supervised by the operating surgeon, because such details are so vital to successful termination of treatment. Emphasis was laid on open reduction in fractures of both bones of the forearm. DR. JACKSON has found Steinmann pins under the fluoroscope of considerable help in the successful treatment of fractures of the neck of the femur; he has also used the Smith-Petersen nail. It is his belief that the patient should be able to be up on crutches in from 10 days to two weeks after initial treatment.

In closing the discussion, DR. MAGNUSON did not wish to be misunderstood—he condemned only the *wholesale* use of plates and screws.

Medical and Surgical Section

THE Nineteenth Annual Meeting of the MEDICAL AND SURGICAL SECTION of the Association of American Railroads was held at Hotel Stevens, Chicago, June 15 and 16, 1939, with the following program:

1. Address by Chairman, including Report of Committee of Direction, by DUNCAN EVE, M.D., Chairman.
2. "Progress in the Control of Syphilis with Special Reference to Railroad Employees," by ALBERT E. RUSSELL, M.D., United States Public Health Service, Washington.
3. Report: Committee on Disability and Rehabilitation, by J. R. GARNER, M.D. (Chairman), Chief Surgeon, Western Railway of Alabama.

Discusson: (a) "Common Colds" and "Cardio-Vascular-Renal Disease," by HARVEY BARTLE, M.D., Chief Medical Examiner, Pennsylvania Railroad.

(b) "Pneumonoconiosis," by A. W. IDE, M.D., Chief Surgeon, Northern Pacific Railway.

(c) "Rehabilitation," by R. A. WOOLSEY, M.D., Chief Surgeon, St. Louis-San Francisco Railway.

4. Address, by M. E. LYNCH, Director, Claim Service, Railroad Retirement Board, Washington, D. C.
5. Report: Special Committee on Medical Aspects of Air Conditioning of Cars, by T. R. CROWDER, M.D. (Chairman), Director, Department of Sanitation and Surgery, Pullman Company.
6. Report: Committee on Developments Resulting from Physical Examinations, by G. P. MYERS, M.D. (Chairman), Medical Director, New York Central System.

Discussion: (a) "Developments from Pre-employment Examinations," by J. FRANK DINNEN, M.D., Chief Surgeon, Erie Railroad.

(b) "Results of Physical Examinations on the C. M. St. P. & P.," by A. R. METZ, M.D., Chief Surgeon.

7. Pamphlet on First-Aid Instructions, issued July, 1938. Discussion: J. R. NILSSON, M.D., Chief Surgeon, U. P.
8. Report: Committee on Fractures, by BRADLEY L. COLEY, M.D. (Chairman), Chief Surgeon, N. Y. C.

Discussion: (a) "Fractures of the Ankle or Wrist," by DUNCAN EVE, M.D., Chief Surgeon, N. C. & St. L.

(b) "Open Reduction of Fractures," by J. R. NILSSON, M.D., Chief Surgeon, Union Pacific Railroad.

(c) "Fractures of the Spine," by T. L. HANSEN, M.D., Chief Surgeon, Chicago, Rock Island & Pacific Railway.

9. "Fractures of the Upper End of the Tibia Involving the Knee Joint," by R. C. WEBB, M.D., Chief Surgeon, Great Northern Railway.
10. "Fractures of the Os Calsis," by OTTO YOERG, M.D., Minneapolis, Minnesota. (Moving picture.)

THE officers elected for the coming year are: HARVEY BARTLE, M.D., (Chief Medical Examiner, Pennsylvania Railroad), *Chairman;*

W. J. LANCASTER, M.D., (Chief Surgeon, Atlantic Coast Line), *Vice-Chairman;* and

J. C. CAVISTON, *Secretary.*

The membership of the Committee of Direction, under the Chairmanship of DR. BARTLE, and with DR. LANCASTER as Vice-Chairman, includes also:

DUNCAN EVE, M.D., Chief Surgeon, N. C. & St. L.

T. L. HANSEN, M.D., Chief Surgeon, Rock Island.

A. W. IDE, M.D., Chief Surgeon, Northern Pacific.

G. I. JONES, M.D., Chief Surgeon, Southern.

JOHN MCCOMBE, M.D., Chief Surgeon, Canadian National.

A. R. METZ, M.D., Chief Surgeon, C. M. St. P. & P.

E. V. MILLHOLLAND, M.D., Chief Surgeon, B. & O.

G. P. MYERS, M.D., Medical Director, N. Y. C.

J. R. NILSSON, M.D., Chief Surgeon, Union Pacific.

O. B. ZEINERT, M.D., Chief Surgeon, Missouri Pacific.

Medicine : Surgery : Hygiene

—Proceedings of the Twenty-Fourth Annual Meeting of the American Association of Industrial Physicians and Surgeons, with the American Conference on Occupational Diseases and Industrial Hygiene, Cleveland, O., June 5, 6, 7, 8, 1939 —

THE AMERICAN CONFERENCE ON OCCUPATIONAL DISEASES AND INDUSTRIAL HYGIENE was officially opened Monday morning, June 5, 1939, with DR. C. D. SELBY, President of the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS, and MR. W. P. YANT, presiding.

The sessions of the AMERICAN CONFERENCE and of the AMERICAN ASSOCIATION extended throughout four days, and presented a wide variety of subjects of interest in industrial hygiene, industrial medicine, occupational diseases, and industrial surgery.

The program included the following subjects and speakers:

Monday Morning, June 5:

Chairmen of the Session: W. P. YANT and C. D. SELBY.

Address of Welcome—HON. HAROLD H. BURTON, Mayor, City of Cleveland.

Response for the Association—C. D. SELBY, M.D., President, AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS.

Opening of the Conference on Occupational Diseases and Industrial Hygiene.

Health of Workers—R. R. SAYERS, M.D., Chief, Division of Industrial Hygiene, U. S. Public Health Service, Washington, D. C.

Physiologic Effects of Hot Atmospheres—F. C. HOUGHTON, Director of Research Laboratory, American Society of Heating and Ventilating Engineers.

Monday Afternoon:

The Public Health Aspects of Occupational Hygiene—HENRY F. VAUGHAN, DR.P.H., Director, Public Health Commissioner, Detroit Department of Health.

Fatigue in Industry—D. B. DILL, Harvard Fatigue Laboratory, (Lantern Slide and Motion Picture Demonstration).

Monday Evening:

The Public Significance of Industrial Health Programs—Guest Speaker: WHITING WILLIAMS, Analyst of Public Opinion, Cleveland, Ohio.

Tuesday Morning, June 6:

Chairman: WARREN A. COOK.

Use of Interferometer for Two Component Mixtures—G. C. HARROLD and L. E. GORDON, Industrial Hygiene Laboratories, Chrysler Corporation.

Modern Dust Control in Underground Mines—D. E. CUMMINGS, Director of Field Activities, Saranac Laboratories.

Evaluation of Benzol Exposures—H. B. ELKINS, Chief Chemist, Bureau of Occupational Hygiene, Massachusetts Department of Labor and Industry.

Study of Motion Picture Industry in Detroit—W. G. FREDRICK, Bureau of Industrial Hygiene, Detroit Department of Health.

A Study of Silicosis in the Silica Brick Industry —W. B. FULTON and A. E. DOOLEY, Bureau of Industrial Hygiene, Pennsylvania Department of Health.

Apparatus and Procedure for Vapor Toxicity Studies—D. D. IRISH, Biochemical Laboratory, Dow Chemical Company.

Possibilities of Control of Lead Exposure by Examining less-than-24-hour Lead in Urine Samples—E. C. BARNES, Industrial Engineer, Medical Department, Westinghouse Electric & Manufacturing Company.

Exposure to Fluorine in Industry—W. F. MACHLE, Kettering Laboratory of Applied Physiology, University of Cincinnati.

Lead Absorption versus Lead Poisoning—R. A. KEHOE, Kettering Laboratory of Applied Physiology, University of Cincinnati.

Toxicity Studies on Some Cadmium Compounds —H. T. WALWORTH, Bureau of Industrial Hygiene, Detroit Department of Health.

Tuesday Afternoon:

Chairman: W. P. YANT.

Toxicity of Benzols — H. H. SCHRENCK, Chief Chemist, Health Division, U. S. Bureau of Mines.

Vapor Tension Method for the Determination of Solvents in Air—L. SILVERMAN and G. REESE, Department of Industrial Hygiene, Harvard School of Public Health.

A New Method of Counting Impinger Samples—C. R. WILLIAMS, Petrographic Engineer, Liberty Mutual Insurance Company.

Calibration and Use of the Gas Interferometer—F. A. PATTY, Director of Industrial Hygiene, Fidelity & Casualty Company of New York.

Air Sampling of Asbestos Dust: Comparison of Impinger and Electrostatic Precipitator Methods —J. W. FEHNEL, Industrial Hygiene Laboratory, Metropolitan Life Insurance Company.

Organization Meeting of the American Conference on Occupational Diseases and Industrial Hygiene.

Tuesday Evening:

Demonstration of lighting research facilities of the General Electric Lighting Institute.

Visibility and Comfort in Seeing—M. LUCKEISH and F. Moss, General Electric Company, Cleveland.

Wednesday Morning, June 7:

THE Twenty-Fourth Annual Meeting of the American Association of Industrial Physicians and Surgeons was opened Wednesday morning, June 7, with G. F. SYKES, M.D., Medical Director, White Motor Company, Cleveland, presiding as Chairman. The following was the program:

The Maintenance of Mental Health in Industry —F. J. ROETHLISBERGER, Graduate School of Business Administration, Harvard University, Boston, Massachusetts.

Fatigue and Employment—R. R. JONES, M.D., U. S. Public Health Service, Washington, D. C.

Plastic Surgery in Relation to Industrial Injuries—DONALD GLOVER, M.D., Associate Clinical Professor of Surgery, Western Reserve University Medical School, Director of Surgery, St. Luke's Hospital, Cleveland.

Wednesday Afternoon:

The Problem of Medical Service for the Small Industrial Plant—M. N. NEWQUIST, M.D., Assistant Director, American College of Surgeons, Chicago; Medical Director, The Texas Company, New York City.

The Relationship of the Industrial Medical Department to Other Personnel Activities—H. W. LAWRENCE, M.D., Personnel Director, Fisher Body Cleveland Division, General Motors Corporation.

Geriatrics in Relation to Employment—W. A. SAWYER, M.D., Medical Director, Eastman Kodak Company, Rochester, New York.

Wednesday Evening:

Annual Banquet — Toastmaster: C. D. SELBY, M.D., President, American Association of Industrial Physicians and Surgeons. Guest Speaker: WILLIAM S. KNUDSEN, President, General Motors Corporation, Detroit, on the subject: *"Human Relations in Industry,"* following with the presentation of the Knudsen Award for the most outstanding contribution to Industrial Medicine, 1938-1939.

Thursday Morning, June 8:

Chairman: R. C. ENGEL, M.D., Chief Surgeon, Cleveland Division, Republic Steel Corporation.

The Repair of Tendon and Nerve Injuries—SUMNER L. KOCH, M.D., Chicago, Illinois.

Making the World Supraspinatus Conscious—E. A. CODMAN, M.D., Consulting Surgeon, Massachusetts General Hospital, Boston.

Treatment of Hernia—DAVID H. M. GILLESPIE, M.D., Associate Surgeon, General Surgical Service, Hospital for Ruptured and Crippled; Surgeon, New York Central, and New York, New Haven & Hartford Railroads, New York City.

Luncheon with Cleveland Rotary Club—Guest Speaker: LOYAL A. SHOUDY, M.D., Medical Director, Bethlehem Steel Corporation, on the subject: *"The Doctor Goes to Work in Industry."*

Thursday Afternoon:

Chairman: H. W. LAWRENCE, M.D., Personnel Director, Fisher Body, Cleveland Division, General Motors Corporation.

Operative Problems in Rehabilitation of the Injured—HENRY H. KESSLER, M.D., PH.D., Medical Director of the New Jersey Rehabilitation Commission, Newark.

Physiotherapy Problems in Rehabilitation of the Injured—JOHN S. COULTER, M.D., Associate Professor and in charge of Physical Therapy Departments at Northwestern University Medical School, Passavant, Illinois Central and St. Luke's Hospitals, Chicago.

The Relation of Trauma to Disease and Its Compensability—SIDNEY MCCURDY, M.D., Supervisor Medical Section, The Industrial Commission of Ohio, Columbus.

Monday Morning

MAYOR BURTON, in his address of welcome, emphasized the importance of the work being done by the American Association of Industrial Physicians and Surgeons, and particularly pointed to the emphasis placed on preventive measures as exemplified in the American Conference on Occupational Diseases and Industrial Hygiene. The progress in prevention is especially significant of later years of effort in these fields. It was believed that if good work is done on a voluntary basis, there will be less chance and opportunity, as well as justification, for government interference. Further, if greater progress can be made on a voluntary basis, there will be obviously less necessity for even a consideration of governmental participation. MAYOR BURTON congratulated the groups on their work heretofore, and expressed the wish that greater responsibilities and achievements might be developed in the future work of the physicians and hygienists.

DR. SELBY responded for the Association, stating that this was a group of scientists composed of physicians, nurses, engineers, and others whose motive is the maintenance of the health of the employed group; these are essentially public health workers. Places of work are being made safer, and the ravages of accidents and diseases are being conquered. The average worker loses one day from occupational causes and eight days annually from non-industrial factors, hence this is a community problem and cooperation with municipal health authorities is extremely important.

MR. W. P. YANT presided as Chairman throughout the remainder of the session.

DR. R. R. SAYERS, in discussing "Health of Workers," said that long ago the group in the U. S. Public Health Service learned through close association with other research groups that it was advisable to write down the fundamentals and needs in various problems, before attacking them. Statistical indices are valuable in indicating the status of health of various groups, but we also have to have individual data; statistics relative to illness, mortality, and minor indispositions, as well as accident data, provide the basis for the measurement of progress. There is much more work to be done, but a lot of data is now avaliable. It is recognized that a great deal of sickness, as DR. SELBY has indicated, originates from non-industrial sources. The data on occupational diseases are not extensive, but we can hope to have better figures — a large percentage at the present time result from irritation of the skin. It is well to keep in mind, however, that although the percentage of lost time caused by occupational diseases is small, the loss represents 300 million dollars annually. The work of the U. S. Public Health Service has been mainly on the causes and control of occupational diseases, and it should be recognized that it takes both medical and engineering groups to do this work. There must be a close correlation of the working environment and the physical manifestations. In a large survey cover-

ing 10,000 persons, it was discovered, interestingly enough, that 41% of the older employees showed defects, while 28% of the applicants for work showed defects — this is probably a function of the age. Chief of the defects were dental caries and defective vision, which corresponds with the analysis of 100,000 examinations made by Sydenstricker and Britton some years ago. Relating to mortality figures, the experience of agricultural workers is taken as a control group. The ratio of morbidity to mortality has been worked out as 300 to 1 in the respiratory affections, 10 to 1 in degenerative diseases, and assumes various other proportions in other types of diseases. There is, therefore, no regular relationship which is static, and we cannot reason as to how much morbidity there may be, using the mortality statistics as a basis. The National Health Survey average shows 10 days lost per year per person from sickness in the general population; in a comparative study where all of the procedures that we now think are proper in an industrial group were put into practice, the figure was found to be five days per employee per year, and more recently another group has established a figure of four and a half days per employee per year. Relating to records, forms of various kinds have been devised by the U. S. Public Health Service, and there is an advisory service set up in this respect. We can conclude, therefore, that much has been done and although much remains to be done, it is sound to assert that the health status of any industrial group can be definitely improved.

MR. F. C. HOUGHTON, in speaking on "Physiologic Effects of Hot Atmospheres," reviewed first the history of mine ventilation; the initial studies were done by the U. S. Bureau of Mines, and later the U. S. Public Health Service and the American Society of Ventilating and Heating Engineers also were concerned in the collection of data. It is an important fact to keep in mind that the heat produced by the body while in a resting state is about 400 B.T.U., and that this heat must be dissipated. As examples of the heat generated by workers, the following were mentioned: clerk—600; carpenters, stonemasons, and bowlers—1500; the maximum production of heat in heavy labor and an extreme exertion may vary from 3000 to 4800 B.T.U. The dissipation of heat occurs by radiation, convection and air movement, the latter of which cannot be affected by physiological control. There is considerable heat lost by evaporation of perspiration and from the respiratory tract, control being exercised here by the availability of moisture. Lantern slides were shown depicting the relation of losses of heat to atmospheric conditions; psychrometric charts; charts on air motion, effective temperature ranges, heat production and loss in human beings, and a wide range of possibilities with different variations in temperature, humidity and air movement; effective temperature curves for different conditions; loss of weight and increased pulse, temperature and vital capacity plotted for various temperatures and humidities, and also counts of increased leucocytes; and metabolic rates in different types of work. It was the purpose of this investigation to chart physiological reactions to different conditions in different types of work, but interpretation has been left to other groups of investigators. The speaker said that conditions in industry rarely are such as to transfer heat from the surrounding air to the body of the worker — usually it amounts to setting up a damming-up mechanism preventing efficient body heat loss. One can say that apparently no harm results from the higher temperatures produced in the usual industrial processes when the conditions do not give rise to increase in body temperature or continue long.

DR. MURRAY FERDERBER, of the Industrial Hygiene Department, University of Pittsburgh, was asked to discuss the formal presentation of MR. HOUGHTON. The interpretations given were really not according to the industrial hygiene, but the physiological, interpretation. It is natural to assume that the body becomes fatigued in the reaction to air conditions, physiologically. In the experience of the discussant, there seemed to be a greater reaction during the winter season. The measurement of vital capacity has no particular significance, although there appears to be a general tendency for the vital capacity to decrease. As ordinarily observed, there was a slight increase in the systolic blood pressure and a slight decrease in the diastolic blood pressure — if conditions were extreme, the systolic and diastolic blood pressures dropped materially. Relative to the use of sodium chloride, it was found that as the interval of exposure increased (after three to four hours) the same amount of sodium chloride as originally advised was not sufficient to maintain the body chlorides at the proper level.

Monday Afternoon

DR. HENRY F. VAUGHAN, in discussing "The Public Health Aspects of Occupational Hygiene," pointed out that there were four stages of evolution of public health: (1) the prebacterial days, when there was stress placed on environment, and there were peculiar ideas on communicable diseases; (2) the bacteriological era, when the emphasis was shifted to persons as carriers of disease, and health education became a fundamental factor; (3) the era of industrial environment accompanied by high speed production, and a realization that dusts, gases, vapors, and other exposures might produce injurious results—this field has become a responsibility for local health departments; and (4) the later social and economic developments, as started by the Social Security Act of 1936, providing the basis for recent developments in the establishment of the present 29 State units in industrial hygiene. (The State of Minnesota makes this total 30.) Large cities can participate in these activities with great advantage. Such activities should not be thought of as a new venture, but should be properly interwoven with other public health relationships, and should be considered as everyday activity of the health department. Approximately two-thirds of the population of Ohio are

involved in what happens to the industrial population. It is important that the staff be continuously educated in public health practice. The physician in general practice should also be shown the part that he can play with advantage. As an example of community health programs and their importance, the work of the W. K. Kellogg Foundation was cited. Finally, industrial hygiene activities should be accepted on the same basis as work in tuberculosis, child hygiene, maternity care, and the other routine activities of the public health department.

MR. D. B. DILL, of Harvard Fatigue Laboratory, presented the subject "Fatigue in Industry," illustrating his remarks with lantern slides and a motion picture. His discussion was centered around the physiological principles of a man at work, during which there is a transfer of chemical energy to mechanical energy and heat. It is remarkable that the 24-hour efficiency perhaps does not total more than 10%. It has been found that fat has less efficiency as a fuel than the carbohydrates. Experiments on dogs have definitely proved that there must be an adequate supply of carbohydrates to continue work. In the experimental work at the Youngstown Steel Mills, the investigators were not able to find acetone in the urine, the answer being that there were sufficient carbohydrates provided so that fat was not used. Haggard and Greenburg showed an increased output of work when morning and afternoon "snacks" were provided. Glucose is an adequate form of carbohydrate to use for increased energy. The lactic acid in the blood furnishes an indication of the oxygen-debt. Capacity for higher oxygen intake reaches a high level at about age 20 and decreases continuously to about one-half of the high mark at the age of 70. The higher oxygen intake means available energy. As to proteins, capacity for work is increased by gelatin intake, as recently experimentally shown in human subjects. It is suggested that gelatin increases the storage of phospho-creatin. German experience has shown that the use of sodium chloride solution restored the physiological capacity of persons who were near prostration, and this relationship has been definitely proved in this country. It seems important to use salt tablets or salt in some other form where profuse sweating occurs. Salted bouillon has been used for the players on the football squad at Harvard, with the results that no cramps were encountered and fatigue is less frequent—it is also possible to play longer without a feeling of fatigue. Variations are great in different individuals, but if production is pushed to 75% of the human capacity, breakdown will certainly occur. Fatigue can be produced in the office, as well as in the factory, as exemplified by the early breakdown of young executives. This presentation was concluded with a very excellent motion picture showing the laboratory apparatus at the Harvard Fatigue Laboratory, and revealing actual tests being made on human beings with regard to work, and also most interesting experiments being made on dogs—which were very willing subjects and enjoyed the work immensely, as shown in the motion picture.

Monday Evening

AS GUEST Speaker, at the Monday evening dinner, WHITING WILLIAMS, Analyst of Public Opinion, Cleveland, Ohio, spoke on "The Public Significance of Industrial Health Programs." MR. WILLIAMS' very interesting talk was much too detailed and personal to summarize; however, he gave from his rich experience in industry, as an observer and worker, interpreting the feelings and emotions of the worker under all sorts of conditions. It was especially emphasized that the worker has a particular attitude concerning his job, and that he looks upon his work as his main interest in life; therefore, anything that affects adversely his working capacity or his favorable reactions to his work is of major importance. MR. WILLIAMS believed that much could be done to improve working conditions, and also that much could be done to improve the health of workers in industry. He believed that a great deal of progress had been made, but that much more can be made in the future with respect to the protection of workingmen against those factors which seek to tear down constructive efforts.

Tuesday Morning

DR. G. C. HARROLD presented the subject "Use of Interferometer for Two Component Mixtures." Little use of the interferometer was made in this problem until very recently. A description of the work of Edwards, and the development of a good method of calibration which applies especially to this problem, were given. Lantern slides were shown effectively, to illustrate calibration curves, the employment of mathematical formulae, and the apparatus used. For technical details, reference should be made to the full paper.

MR. D. E. CUMMINGS discussed the subject "Modern Dust Control in Underground Mines." The standard mentioned for concentration of dust was a limit of five million particles per cubic foot of air for pure silica and not more than 50 millions for mixed dusts. Lantern slides were used to show a mine ventilation machine applied to different types of mines and different problems in the mines. With respect to water, the only objection to its use is where the temperature and humidity are high. A great deal has been done with the use of water in drilling. Positive-pressure respirators, U. S. Bureau of Mines approved, have been employed with considerable success where it has been necessary to supplement the exhaust ventilation or where in certain situations it was impossible to provide efficient artificial exhaust. Illustrations and lantern slides were also shown, with reference to dust and gas measuring apparatus and the laboratory procedures carried out in the analysis of dusts and gases in mines.

DR. H. B. ELKINS presented "Evaluation of Benzol Exposure." It has been determined that chemical methods are more accurate than physical methods in this problem. The methods of Smyth and of the Bureau of Mines were used in various studies. Lantern slides showed the sampling apparatus. In comparing the two methods mentioned above (which are micro-methods) it was decided that both are laborious; the Bureau of Mines method is more accurate for low concentrations, and vice versa; there is no systematic error in either method; the volumetric method is more reliable than the colorimetric; and the colorimetric method is of greater value where toluol is present in the atmosphere. The urinary sulphate analysis was discussed, and the previous precautions were given consideration; originally it was advised that samples be taken at the end of a working day and at the end of a working week and analyzed at once, or put on ice. It is, however, not necessary to analyze these at once, and it has also been determined that the afternoon urine gives the maximum effect. It has finally been concluded that the 24-hour sample is probably the best.

DR. W. G. FREDRICK discussed "Study of the Motion Picture Industry in Detroit." This study was based upon observations of 233 projectionists working in all types of booths and under all sorts of conditions. Often the booths are of makeshift type, and the sanitary facilities are poor in a rather surprising number. The average volume of these booths is approximately 900 cubic feet. The amperage was highly variable in different projection booths: there were 72 booths having an amperage of approximately 40; 37 having an amperage of 40-85; and 38 booths showing an amperage above 85. City laws require an 18-inch fire chimney in the room; this is connected directly with the projectors. The suggestion here is to provide for fresh air intakes, so that there will not be a back-surge of the gaseous atmosphere which would normally be taken out by the proper intake through the chimney. The grab sample method was used in analyzing the air by the oxidation method and colorimetric determination. Apparently there was no association between the type of carbons and the oxides produced. The author took the value of 10 parts per million as the limit and the results showed variations from zero to eight parts per million in this study. Carbon dioxide determinations were not done, but ozone samples were taken. The noise in some booths was highly objectionable. It was concluded that there were no alarming gas exposures, but that the gases which did occur were principally of the nitrogen oxide type; it was believed that the working conditions were fairly good in this survey.

MR. A. E. DOOLEY presented "A Study of Silicosis in the Silica Brick Industry" which had been prepared by him and DR. W. B. FULTON. There were two types of dust exposure in this study, that which is mainly free silica and that which is dust of other types. In the process, quartz is converted into tridymite and cristobalite, which are themselves forms of free silica. The silica brick itself is composed of about 98% free silica. The average number of employees in this industry is approximately 2700, and about 72% of the United States production is manufactured in the State of Pennsylvania. Quartzite rock is the raw material mainly used. Slides were given to illustrate the crushing process, the firing operation, the mixing operation, the molding operation, and drying and kiln operations. It was illustrated that the dust goes through the same change in firing as the product itself. Statistics given in regard to the incidence of silicosis showed that of 1035 workers exposed, 538 had silicosis, and, of these, 11% showed a positive sputum for tuberculosis. In the dusty operations, the average exposure was 16 to 17 millions of particles of dust per cubic foot of air.

MR. D. D. IRISH discussed "Apparatus and Procedure for Vapor Toxicity Studies." The essentials of the apparatus and the methods were illustrated by lantern slides, showing the Bureau of Mines metering pump, the animal rooms, special apparatus for sampling, and special apparatus for analysis. These methods were described and their uses indicated. For fuller description of techniques, the complete paper should be consulted. It was concluded that work of this type forms the basis for practical investigations in industry and the evaluation of toxicological data.

MR. E. C. BARNES presented the subject "Possibilities of Control of Lead Exposure by Examining less-than-24-hour Lead in Urine Samples." The intake and excretion of lead are directly related. In doing this kind of work, the practical difficulties were considered in getting samples delivered and also the difficulties in getting the samples collected under proper precautions. By collecting in the plant medical department, however, these difficulties were considerably overcome, and were also overcome at home by proper directions and warnings. The dithizone method of analysis was used throughout. It was found that there was no correlation between the lead content of the urine and the other urine characteristics. The important principle in this study was the showing that there was a variation during different times of the day in the excretion values, but that the values had a sufficiently narrow range to be useful in practical problems.

DR. WILLARD F. MACHLE discussed "Exposure to Fluorine in Industry." Fluorosis has now come to be a well-established clinical entity. This paper was concerned mainly with the establishment of the threshold of exposure. The bones of the vertebrae and the pelvis are mainly affected at first with an increased density as shown on radiograph, and spicule formation. The long bones are thickened and the marrow cavity is narrowed. We are concerned there with cryolite and rock phosphates, and there are few cryolite mines

in this country. The roentgenographic changes form the most important basis for diagnosis, although the symptom complex includes anorexia, nausea, anemia (silicosis as an incidental disease) and eosinophilia. The experimental data on animals are greatly variable. There are several conditions which are definitely associated with fluorine intake, namely mottled enamel; osteosclerosis; fluorine cachexia; involvement of the teeth and the mandible in animals; and dental disease in animals. The plant where this study was made has been in operation since 1931 and there are roentgenographs taken on 10 men serially since 1934. The urinary excretions were compared, since fluorine is excreted mostly in the urine, the normal amount being set at 1 milligram per liter of urine. Lantern slides were used to illustrate the changes in the bones and tabulations of fecal and urine analyses.

DR. ROBERT A. KEHOE presented the subject "Lead Absorption versus Lead Poisoning." There is still a lot of lead poisoning in spite of the progress that has been made in the control of lead exposures in industry. A thorough discussion was given of the relation beteen concentration of lead in the urine and blood. The technique of the collection of samples was given serious consideration, because of the difficulties involved. Comparisons were made between normal lead metabolism and abnormal lead metabolism. Lantern slides were used for tabulating the amount of lead found in various organs at autopsy in individuals at various ages. Of a group of 400 persons, the mean value calculated for fecal excretion of lead comes to about 0.2 milligram. For urinary excretion, the figure of 0.04 milligram per liter of urine seems to be a very close approximation to the mean normal figure in the American population. For further details regarding the tabulated figures, one should refer to the original paper.

Tuesday Afternoon

MR. H. T. WALWORTH discussed the findings of "Toxicity Studies on Some Cadmium Compounds." There has been an increase in the use of cadmium compounds to nearly double during the period 1933 to 1937. The principal uses are in plating, for pigments, and for alloys. The automobile industry uses about one-fifth of all of the amount of cadmium compounds consumed annually. Experimental work is done on rabbits and rats by the use of inhalation and injection methods, both metallic cadmium and cadmium lactate being used.

The minimum lethal dose was established at 50 milligrams in rats and 90 milligrams in rabbits. The principal clinical findings were loss of appetite and weight, accompanied by diarrhea. The lungs were the main seat of pathological changes as noted in the autopsied animals. For estimating the air content of cadmium and its compounds, the impinger method was used as the collecting apparatus and the sulphate method for the chemical analyses.

DR. H. H. SCHRENCK spoke on "Toxicity of Benzols." This was a summarization of a number of previous papers, and was concerned with the symptoms, response and exposure data. Three types of benzol were used in the experiments, that known as pure benzol, that known as commercial benzol, and that known as crude benzol. Lantern slides illustrated effectively the chambers used for dogs and guinea pigs. It was found that the pure benzol was relatively more toxic in the guinea pig series and that there were greater decreases in the white and red blood cells. Commercial benzol was less toxic than the pure, and the crude definitely less toxic than either.

MR. L. SILVERMAN discussed "Vapor Tension Method for the Determination of Solvents in Air." The method has not had wide application because of certain difficulties. The present apparatus is adapted to grab samples, and the principle on which the apparatus works is Dalton's law of partial pressures. The apparatus was described by lantern slides and the correction for various factors discussed. The use of this apparatus is limited to single solvents and those not soluble in water.

Among the numerous solvents on which determinations have been made are included xylene, benzol, carbon tetrachloride, trichlorethylene, and others. It is necessary to correct for reading in the use of the apparatus with regard to certain specified solvents, but there is no correction for water vapor, as this is automatic. The apparatus has a capacity for taking about eight samples a day.

MR. C. R. WILLIAMS discussed "A New Method of Counting Impinger Samples." A review of the difficulties of the present methods was given. It is believed that the present optical system should be changed so that the recommendations for a new system would be as follows: a 16 mm. objective with an aperture of 0.25 or 0.30; a 30X compound eyepiece; an Abbe condenser with an aperture of 0.4. This optical set-up gives a magnification of 300 diameters and a substage lamp will provide adequate illumination. With this optical system, and one of the most important changes, is the use of the Spencer bright-line haemocytometer with the Neubeuer ruling. This has a special metallic covering, diffuses a lot of light and cuts out a great deal of glare. The rulings are so provided that they can be used as a means of identifying particle size. The use of this haemocytometer obviates the necessity for the use of a Whipple disc and the lines remain always as cut originally, without the necessity for having calibration. The formula was given for the evaluation of the count in terms of millions of particles of dust per cubic foot of air sampled. In checking with the old method using the Sedgwick Rafter cell and the original magnification, the results come within the range of error. The chief advantage to be derived is an increase in the speed of counting, this varying from five to eight times, according to the operator.

MR. F. A. PATTY presented a paper on "Calibration and Use of the Gas Interferometer." This apparatus is not used as much as it should be. The principles were explained, especially the most important principle, that being that the apparatus is based upon the use of the refractive index. It is necessary to remove interfering substances. In each instance, unit refractive values are used for different substances and a table of values for 40 different types of compounds was given. It was finally emphasized that the use of the portable gas interferometer should be more widely adapted to general industrial problems. The paper was rather technical in type and reference should be made to the original text for details.

MR. J. W. FEHNEL gave the last paper on the industrial hygiene program on the subject "Air Sampling of Asbestos Dust: Comparison of Impinger and Electrostatic Precipitator Methods." A comparison of the samples showed 50% of the particles under two microns in diameter; not more than 3% were shown to be 10 microns in Fulton's study, which agrees with the present report. The work of Gardner on mechanical action of asbestos on the lungs was reviewed and commented upon. Recently there has been an electric precipitator placed upon the market for commercial use. Tables and slides were given of comparative data for the two methods, leading to the conclusion that the impinger and electric precipitator methods agree within a very narrow range of variation—that the latter method more successfully traps fibers, the significance of which is not as yet entirely settled hygienically.

FOLLOWING the Tuesday afternoon session, the American Conference on Occupational Diseases and Industrial Hygiene held a meeting for the purpose of effecting a permanent organization. Under a constitution and by-laws duly adopted, the new society, the AMERICAN INDUSTRIAL HYGIENE ASSOCIATION, elected officers and directors as follows:

President: W. P. YANT, Research Director, Mine Safety Appliances Company.

President-elect: WARREN A. COOK, Zurich General Accident & Liability Insurance Company.

Secretary-Treasurer: GORDON C. HARROLD, Industrial Hygiene Laboratories, Chrysler Corp.

Directors: DON E. CUMMINGS, Saranac Laboratories, Saranac Lake, N. Y.; W. G. FREDRICK, Bureau of Industrial Hygiene, Detroit Department of Health; CHARLES POOLE, Rhode Island Department of Health; H. H. SCHRENCK, Chief Chemist, Health Division, U. S. Bureau of Mines; S. W. GURNEY, Liberty Mutual Insurance Company; F. A. PATTY, Director of Industrial Hygiene, Fidelity & Casualty Company; PHILIP DRINKER, Harvard School of Public Health; F. R. HOLDEN, Pittsburgh Plate Glass Company; and J. J. BLOOMFIELD, U. S. Public Health Service.

Tuesday Evening

BY SPECIAL arrangement, a demonstration of the lighting research facilities of the General Electric Lighting Institute was held at Nela Park, after a buffet dinner scheduled for 6:30 P.M.

Following a visit through the Research Institute, DRS. M. LUCKEISH and F. Moss, of the General Electric Company, at Cleveland, lectured on "Visibility and Comfort in Seeing."

Wednesday Morning

THE Twenty-Fourth Annual Meeting of the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS was opened at 9:00 o'clock, with DR. G. F. SYKES as Chairman of the session.

In the absence of F. J. ROETHLISBERGER, who was scheduled to speak on "The Maintenance of Mental Health in Industry," and also in the absence of DR. R. R. JONES, of the U. S. Public Health Service, who had been scheduled to speak on "Fatigue and Employment," DR. R. R. SAYERS, of the U. S. Public Health Service, spoke on the latter subject.

DR. SAYERS defined fatigue, giving several different definitions, and stated that fatigue is not a clinical entity, but that it is a symptom complex. The literature is voluminous on this subject. It is not a characteristic of fatigue that it can be measured by the production of lactic acid, but is rather a lack of power to carry on oxidation at regular rate. One is unable to check accurately the basis for physiological variations. A great many factors enter into the production of fatigue, such as the kind and rate of work, the temperature, humidity and ventilation afforded, the hours of work, noise, posture —all of these play their respective parts, as well as work supervision, which must not be forgotten. Reference was made to the effect of music in the establishment of rhythm and helping to delay the onset of fatigue.

In the discussion of this subject, the use of various substances for the prevention of fatigue was mentioned, such as glycocoll, with the comment that some had tried certain various substances but had gone back to glucose.

DR. DONALD GLOVER presented the subject "Plastic Surgery in Relation to Industrial Injuries." It is important to emphasize that the first treatment of wounds often may prevent the necessity for later plastic work. Proper debridement and suturing, care in closure, observance of skin folds, lines and cleavage planes, proper tendon repair, the use of skin grafts early in large defects of skin surface—all operate to produce results which may be of such a type that further plastic work will not be necessary. A series of lantern slides demonstrated various types of cases. A motion picture was shown relative to the technique and results of Thiersch grafts. Various lantern slides of reconstruction of the conjunctival sac, nose, ear, hands, axilla, neck, feet, were shown in which results were measured with reference to function and cosmetic effects. Finally, as a closing portion of the presentation, a discussion of tendon reconstruction was given.

Wednesday Afternoon

DR. M. N. NEWQUIST discussed "The Problem of Medical Service for the Small Industrial Plant." This is not a new subject, but the indif-

ference of employers of small groups has been noted as exemplifying that it is believed that medicine in industry is still a "patch up" job. It is conceivable that sickness in the smaller groups is proportionately greater than in the larger groups, since injury occupies the same statistical frequency. The points emphasized in regard to health and medical services in smaller groups were: (1) health promotion; (2) the care of industrial accidents and occupational diseases; (3) control of health hazards; (4) reasonable first aid for sickness and injury; and (5) cooperation of plant managers, local physicians and community health groups. Cost seems to be a stumbling-block in the more frequent adoption of medical services by smaller groups. Such services are frequently supplied by insurance carriers, and usually the curative aspects are emphasized. Standards must be raised by attracting men with ability, by giving courses in industrial medicine and surgery in the regular medical curricula. Men should be trained through medical departments in industry by correlative courses in industrial surgery. The troubles of free choice and objections to physical examinations vanish when good service is provided in industry. If the insurance companies and industry will get together in a cooperative attack on the problem, many important things will easily be done. The selection of competent men was again emphasized. It appears that in large plants the average cost per employee per year is $5.00 to $10.00, whereas in the smaller plants it is $10.00 to $15.00. Evarts showed that a minimum service can be provided at a per capita cost of $10.00 per year. It can, therefore, be concluded that an adequate service can be provided for the small groups.

Dr. Frederick Slobe, in discussing this paper, stated that usually a lack of interest formed a definite handicap, and, furthermore, that there was great ignorance concerning this subject among employers; therefore, the necessity for proper education.

Dr. H. W. LAWRENCE made a presentation on "The Relationship of the Industrial Medical Department to Other Personnel Activities." Human failure is costly. The quality of personnel is a definite element in successful industrial progress. Cooperation of the medical department in other activities is highly essential. When claims arise there is given an opportunity to investigate conditions and to provide complete follow-up, the latter of which is very important. It is also an opportunity to supply helpful aid to the compensation department, but one cannot afford to lose the confidence of the claimant and therefore must proceed cautiously. The medical department certainly must interpret the technical reports to the other departments in industry. Cooperating with the employment department, the determination of employee attitudes and the evaluation of such attitudes is the most vital thing in industrial relations today. The medical department has an unusual opportunity here. It is essential, however, that the medical department shall not go too far in the extent of medical care. Sanitation and hygiene are also considerations of great value. It is just as important for the medical department to appraise human material, as for the engineering department to appraise its materials. In public relations, the medical department has a definite part to play with reference to community and national health groups. Safety procedures should be coordinated with the medical program. In this respect, the study of hazards and control is necessary. With reference to the educational department, the medical department should participate in the evaluation of training courses, regarding bulletins, articles, and various other publications. In summary, it is the duty of the medical department to participate in prevention, alleviation, and instruction.

Dr. W. A. SAWYER talked on "Geriatrics in Relation to Employment." The problem of the old employee has been one that has not attracted much attention, but it is now of some moment, principally because of the various aspects of unemployment. The age of 65 has been set as the threshold of old age, but this may have considerable variation physiologically. Diseases common to old age are those of the respiratory system, cancer, arthritis, heart disease, diabetes, and others not occurring as frequently. We are concerned not alone with pathological changes, but also with motivation, with spirit, and with adaptability. It is of considerable significance that the average age is older now than 10 years ago in industrial employees. The figures have probably been distorted as to the numbers of young men being hired — probably there are many instances of rehiring which were also counted. The figures of one industry showed that 36% were under 21 years of age; 21% between 22 and 25; 17% between 26 and 30; and 5.3% over the age of 40 years. It is of interest to know that this distribution corresponds with the general population distribution. In the oldster, retraining and transfer may be necessary, but with medical supervision the problem is easier; in fact there is no greater difficulty than with younger men. Accident frequency is less in those over age 40 than under (about 40% and 60% respectively). There is, however, more illness over age 40. In a group of 12,000 employees, the absence rates were found to be 26.1% for ages 17 to 29; 22.2% for ages 30 to 39; 22.2% for ages 40 to 29; and 29.7% for ages 50 and over. In concluding, Dr. Sawyer referred to a recent report of the Labor Department on this general subject.

Wednesday Evening

THE ANNUAL BANQUET of the American Association of Industrial Physicians and Surgeons was held at 6:30 with Dr. C. D. Selby, President of the Association, as toastmaster. The guest speaker, Mr. William S. Knudsen, President of General Motors Corporation, Detroit, spoke on "Human Relations in Industry." Mr. Knudsen then presented the Knudsen Award for the most outstanding contribution to industrial medicine during 1938-1939. The award was made to Dr. C. O.

Sappington, of Chicago, and was based on his recent book "Medicolegal Phases of Occupational Diseases."

Thursday Morning

Dr. SUMNER L. KOCH, of Chicago, presented the subject "The Repair of Tendon and Nerve Injuries." The surgical principles of successful tendon operations may be divided into three groups: (1) use of fine suture material, reduction with the minimum amount of trauma and oozing and remembering that a smooth gliding surface is the ultimate result desired; (2) a very careful and painstaking examination before operation; and (3) conservative treatment in cases where the patient has already had first aid treatment, realizing that infections come mainly from the respiratory tracts of those around the patient. Tendon transference is very helpful. Immobilization is one of the cardinal principles of proper tendon healing; the parts must be set at rest. Incisions should be made parallel to the skin creases. A series of slides demonstrated the treatment of wounds and injuries to various nerves. Slides also demonstrated the types of incisions which were necessary. A description of the stay suture for tendon suturing was also given. For nerves only fine sutures through the perineurium should be used. Various illustrations of operation procedures and after-care, including diagrams of operations and apparatus and technique, with demonstration of special splints and their uses, completed the presentation.

In discussion, it was brought out that a simple examination of test for sensation would reveal whether nerves have been injured. A bloodless field by the use of a blood pressure cuff with pressure of 250 mm. is a simple expedient, but gives excellent results. If the wound has been contaminated, it should be cleaned, dressed, and put at rest. If there has been a streptococcic infection, it is warranted if one waits in some instances as long as 12 months before trying to really do any constructive operative work.

Dr. E. A. CODMAN discussed the subject "Making the World Supraspinatus Conscious." There is an important principle for exploratory operation in injuries to the shoulder, but apparently so far there has not been much success in getting recognition of this principle. During the past 30 years there has been, however, some slow dissemination of appreciation of this procedure. The anatomy of the shoulder has been grossly neglected by many surgeons. Many times an operation occurs too late to do any good. In rupture of the tendon of the supraspinatus, the only outstanding symptoms are pain and lack of use, and these findings are liable to be confused with arthritis. Details of suggestions to the American College of Surgeons were given relative to the publication of recent advances periodically. It was also suggested that the Association might cooperate in this respect.

In discussing this presentation, Dr. George W. Crile mentioned that a registry of bone sarcoma adopted by the American College of Surgeons at the suggestion of Dr. Codman had proved to be of great value. It was further believed that the adoption of the suggestion of the publication of recent advances periodically would also establish good public relations.

Dr. DAVID GILLESPIE spoke on "Treatment of Hernia." There is no subject of greater importance to surgery. Hernia is well in the forefront of causes for rejection. Dr. Gillespie's discussion had reference to treatment, and included treatment by truss, by operation, and by injection. Obviously, a truss is not a cure-all, and it has its limitations; it does, however, provide a palliative safety measure which must be constantly checked in order to be effective. In the operative treatment, the various types of operations were mentioned and described. Particular emphasis was laid on suture material, statistics being given for 314 cases of femoral hernia; recurrences occurred to the number of 9.1% with silk suturing; 6.2% with catgut; 27.7% with the so-called Gallie suture. Thorek's operation for undescended testicle was described, and it was mentioned that it gave good results. Bassini's original work on inguinal hernia was reviewed, and it was stated that the Bassini operation was still the operation of choice for this type of hernia. It is desirable to mobilize the layer from above downward in dealing with the transversalis fascia — this helps to reduce recurrences. In a 10-year study of the use of the Gallie suture, it was found that infection was more common and recurrences more frequent, and that there was no foundation in fact for the original theory. If extensive dissection is necessary, there is much scar tissue produced, with free bleeding. Furthermore, there is a great deal of handling of the fascil strip; the sutures have a tendency to pull out. The recurrences after one year are almost twice those which occur before one year's lapse of time after the operation. In the use of silk sutures, experience has shown that some time is necessary in order to learn how to use silk. A division of the cord is an important principle. There is no method of hernia operation which gives absolutely sure results, as there are causes beyond the control of the operator, such as age, type of hernia, occupation, and condition of tissues; there are, however, causes which are within the control of the operator, such as selection of the type of operation, prevention of postoperative complications, the avoidance of infection, proper postoperative care, and others. It was concluded that operation is the method of choice in most cases — there are few where injection alone is advisable. Figures were given for the injection method based upon 66 cases, in which there were 84% failures; 6.6% of possible cures, including the wearing of a truss, and 9.3% of so-called actual cures. The difficulties which present in the injection method are those of delivering the injection solution where most needed and of promoting gradual absorption; it was determined that one solution is as good as another. Fowler was

quoted as saying that we have little adequate knowledge on the recurrence rate of the injection method. Keily believes that the sclerotic tissue entirely disappears.

AT AN especially arranged luncheon at the Cleveland Rotary Club, the guest speaker was Dr. Loyal A. Shoudy, Medical Director, Bethlehem Steel Corporation, who spoke on "The Doctor Goes to Work in Industry." A review of the doctor's work in industry was made, and human relationships were especially stressed. Experiences from Dr. Shoudy's rich supply were given to show that in industry medical work is a "man-to-man" responsibility, and that one can make considerable progress by instilling confidence; in fact, this is the basic principle. A plea was made for more close cooperation between management and medical men.

Thursday Afternoon

DR. HENRY H. KESSLER gave an excellent presentation on "Operative Problems in Rehabilitation of the Injured." This was a combined lantern slide, motion picture, and patient demonstration of the use of the cineplastic arm. The technique of the preparation of the arm was explained both by slides and motion pictures and by allusion to the patients, and the mechanics of the cineplastic apparatus were likewise demonstrated by these means. It is impossible to give an adequate word picture of the interesting and unusual results which have thus been obtained, but the simple principle is to establish the use of an apparatus which permits grasping objects with an artificial hand, by making use of the muscles which remain to control this grasping power. Dr. Kessler has had about 100 cases of this type, of which 50 were considered successful, about 25 fair, and the rest failures. Cases must obviously be selected carefully, but it has been found that re-education of the muscles is not necessary to success. The cost of the apparatus varies from $175 to $250 according to the site of the amputation.

DR. JOHN S. COULTER demonstrated by lantern slides "Physiotherapy Problems in Rehabilitation of the Injured." It is important that the physician should do the prescribing of physical therapy in using this form of treatment. Dr. Philip Wilson has stated that the next great advance in fracture treatment is the recognition of physiotherapy methods, and that this form will outstrip others if properly used by physicians. One does not need expensive apparatus, but it is well to use money to buy personnel. It is also of importance to know that there is a national registry for physical therapists. Various forms of therapy used were mentioned, such as heat and massage; warm paraffin baths; short wave diathermy; electricity; under-water exercises. Ingenious apparatus was demonstrated by lantern slides, for example, the use of bike pedalling in bed; walking bars used in front of a mirror; foot and ankle apparatus similar to a pedal; inversion tread, and many others of equal ingenuity and value. It was especially stressed that the American Medical Association has had for many years a special council on physical therapy, which published a book and a description of apparatus and technique available to physicians.

DR. SIDNEY McCURDY presented the last paper of the meeting on "The Relation of Trauma to Disease and Its Compensability." During the experience of past years it has been found that there are many queer and weird opinions relative to this subject. One of the difficulties is the lack of recognition of the importance of cause and effect relationships. Lawyers and doctors have different ideology. The patient's statements should be checked carefully before accepting them. In at least 80% of claims cases, medical opinion is important. Mention was made of the medical referee system in operation in Ohio relative to occupational disease claims. Illustrations were given of questions and answers from actual claims cases, exemplifying peculiar answers. In a recent study of injury and its relationship to lues, especially regarding fractures, no relation to delayed healing was established. Several important decisions were referred to. Finally, discussion of the relationship of trauma to heart disease was given.

This concluded one of the most successful meetings the Association has ever held.

On the Air

THE first of the four broadcasts from the Convention was that of Dr. Carey P. McCord, who spoke at 5:30 P.M. on Tuesday, June 6, on WGAR. Dr. McCord's subject was "The Industrial Worker and His Trade Diseases."

He said:

IN THE United States, workers may earn their wage or salary in not less than 7,000 different trades or jobs. Alphabetically these thousands of trades range from 'accordian makers' to 'zooglers.' If you do not know what a 'zoogler' is, permit me to describe him as the workman who rides and guides a timber log, as it rushes down a river or floats in a pond. Directly or indirectly, two thirds of this country's population depend upon the men and women who ply these 7,000 different occupations.

"It is most unfortunate that, connected with such activities, many scores of opportunities exist for diseases to be produced by the substances handled in these work enterprises, or from the machines necessary in trade processes. All considered, there are no less than 2,000 different chemicals or conditions connected with work capable of damaging exposed workmen and leading, in many instances, to direful disease states. Such diseases are known as occupational diseases or trade diseases.

"These occupational diseases are by no means new developments in this country or in any other portion of the world. Wherever industry has existed a few occupational diseases likewise have arisen. One of the earliest, well known occupational diseases occurred among chimney sweepers. Long before this country was discovered many small boys and adults with small bodies were employed in European cities to crawl up through small chimney flues and brush down the soot from the walls. This soot contained irritating chemicals and, as a result of their action, every year a few of these chimney sweeps developed 'chimney sweep's cancer,' a characteristic occupational disease.

"This old disease has passed, but in its place scores of highly different occupational diseases yearly arise—arise here in Cleveland, throughout the State of Ohio, and everywhere else that industry exists. They are not limited to heavy operations such as mining or the manufacture of steel or the construction of buildings. Even in the least arduous of tasks they may arise. Let us take a few typical examples.

"The school teacher using colored crayons in the school room may become the victim of lead poisoning because some green, yellow, orange and lemon crayons may contain lead. She breathes the crayon dust containing lead. If exposure is sufficient she may begin to present the peculiar characteristics of lead poisoning. Of course school children are even more likely to acquire lead poisoning from this source, but in their case the disease is not occupational.

"The beauty parlor operator, aiding women in their quest for beauty, may exhibit a disturbing skin disease from the chemicals she applies to the customer. The customer is ordinarily not affected, but the beauty parlor operator, because day by day she comes in contact with these irritants, may acquire this disease.

"To the little informed it might seem that the trade of fur working could afford no opportunity for an occupational disease. The contrary is true. Some of the dyes that are applied to furs, chiefly cheap furs, have the peculiar property of causing asthma. 'Furrier's asthma' is well known wherever furs are cut, dyed, or made into garments.

"In the manufacture of felt hats, rabbit hair is almost universally used. Untreated rabbit hair has such a smooth wall that it will not interlock or mat with other hairs to form a compact sheet. To accomplish this the rabbit hair is given a barbed surface by treatment with what is known in the trade as a 'carot.' The usual chemical employed in carotting is mercury nitrate. Mercury poisoning is a frequent disease among these hat makers.

"Even professional workers are not free from occupational diseases. The physician to whom you go for an x-ray examination might become dangerously injured through day-by-day exposure to x-rays.

"In more strenuous trades, occupational diseases are even commoner. The sand blaster may acquire silicosis, a severe variety of dusty lung disease. The glass maker may develop blindness or near-blindness from injurious heat rays. The arc welder, on occasion, may be exposed to manganese and conceivably may develop manganese poisoning. The boiler maker, working in a din of noise, may develop noise deafness. The street worker who digs up paved roadways may acquire from the vibration of his air hammer queer cysts around the tendons near the wrist. In the past few days both in the United States and England submarine disasters have occurred. In both countries efforts by divers to rescue those imprisoned have been hampered and curtailed by the continuous threat of 'caisson disease' or 'diver's disease' which may arise whenever these under-water workers are required to perform their duties under greatly increased atmospheric pressures.

"And on and on, through a thousand different trades, other exposures may be found.

"It is most fortunate that almost without exception these diseases may be prevented. The school teacher may be supplied crayons free from lead, the sand blaster may be protected by the substitution of steel grit for silica sand. The beauty parlor operator may be furnished non-irritating beauty preparations. The physician who may be burned by his x-ray equipment may be fully protected by a lead apron and lead-bearing gloves. Day by day new measures are being found for the adequate protection of all workers against dangerous work exposures.

"Here in Cleveland many hundreds of physicians, toxicologists, engineers and chemists now are meeting in professional conferences for discussions of ways and means for the protection of industrial workers as they go about their daily tasks. Thoughout the land, physicians, engineers, and public health workers day by day apply these life-saving appliances and procedures.

"Soon the time may come when there will be no actual cases of occupational diseases in this country because of adequate protection of all dangerous operations. Until that time comes, every worker, however he may gain his livelihood, should give thought to the most practical means of avoiding the occupational diseases peculiar to his own work. Otherwise the possibility exists that his year by year duties may take an unwarranted toll from his health and from his years of life."

THE second broadcast was that of MR. KNUDSEN'S talk on "Human Relations in Industry," and his presentation of the WILLIAM S. KNUDSEN AWARD to DR. C. O. SAPPINGTON, at the Annual Banquet on Wednesday, June 7. The proceedings were on the air from 8:15 to 9:00 P.M., on WHK, Cleveland. MR. KNUDSEN'S talk appears, in full text, on pp. 307-310 of this issue. At the conclusion of his address, MR. KNUDSEN conferred the AWARD (see p. 310).

The third broadcast was that scheduled for DR. SELBY, who was to have introduced DR. SAPPINGTON as the recipient of the AWARD, on WGAR at 9:45 P.M. on Wednesday, June 7. But the entrance of the King and Queen of England into the U. S., which had priority on all networks, was holding the air at that time, and so this broadcast was not carried out as planned.

The fourth was the talk by DR. MCIVER WOODY, newly installed as President of the A. A. I. P. & S., at 5:00 P.M. on Thursday, June 8, over WGAR. DR. WOODY said:

FIRST, I should like to congratulate DR. CLARENCE D. SELBY, retiring President of our Association, and DR. G. F. SYKES, Chairman of the Cleveland committee, on the excellent program they provided for us this year. We are always glad to come back to Cleveland for our annual meeting; because we know from past experience that we are sure to have a large attendance, see old friends, and thoroughly enjoy ourselves.

"You know, when one stops to think of it, it *is* rather remarkable that this Association of ours has been so uniformly successful ever since it was formed back in 1916. We industrial physicians, who are in daily contact with the managers of business organizations, are perhaps in a better position than most to appreciate the vicissitudes through which we have been passing.

"During the past 24 years, we have lived through a World War, a brief period of readjustment, a longer one of uncontrolled speculation, and then the 'Great Depression,' which some say is with us yet. We have seen some concerns build up efficient medical departments, and then later on, under the urge of dire necessity, liquidate them. Nevertheless, our Association has grown in the same length of time from a small group of men who believed in the need for such an organization, to a national society with a thousand members, in which every part of the country, and every variety of industrial concern, is represented.

"Now, the reason for this rather remarkable record is, to my way of thinking, simply this—that this organization was formed in response to a real need, and that throughout its existence it has fulfilled purposes that are useful. As a matter of fact, this condition of existence applies to all human institutions. Even the greatest of our universities is no exception to this rule.

"About three years ago, when the outlook was most discouraging, the president of one of our largest universities had to admit that the book value of their endowment funds had shrunk, and that the flow of new gifts had all but ceased; and yet he had the courage to believe that so long as the university remained true to the purposes for which it had been founded, it would survive and flourish. He frankly admitted that institutions, like individuals, may suffer from internal decay, which, while yet un-

perceived, still renders them unable to cope with new and changing conditions; nevertheless, he maintained, universities (and societies) are seldom wholly destroyed from without. They usually perish from causes within themselves. Human institutions, he said, may commit suicide; but they are not killed so long as they really serve a purpose that is useful.

"What the educator said about educational institutions is also true of other institutions and societies whose purpose are equally sound and worthy. The point I wish to make is simply this, that so long as the Association remains sound enough to adapt itself to changing conditions, and still remains true to the principles on which it was founded, its future is bright and its position among other medical societies is assured.

"Certainly, Industrial Medicine, in recent years, has become an increasingly important factor in the success of industry. Through activities of men engaged in industrial medicine, mortality rates of workers have been decreased. Men and women live longer these days because of the progress of medicine generally, and, in the case of industry, the additional stress given the care of occupational diseases.

"Since my colleagues have seen fit to elect me President of the Association for the coming year, I welcome the opportunity to carry on the fine work which this association has stood for during the past 24 years. I pledge myself to follow the excellent example of Dr. Selby, the retiring President, and I wish to assure him that we, of the Association, will do all in our power to further contribute to industry's effectiveness with every resource modern medical science has at its command.

"And now, let me say that we medical men are just like other people in that we like to attend meetings where we are sure to find old friends and make new acquaintances who are interested in the same things we are. Some of us are connected with large organizations, such as General Motors or du Pont, that employ as many as 50 or 60 physicians; others have government jobs with the Public Health Service, or with State Boards of Health. Some of us teach in medical schools; others are specialists with downtown offices. But, one and all, we have one interest in common All of us devote a large part of our time to looking after people who are injured while at work or who get sick while they are on the job. What is more, we like to feel that in various ways we are able to help men, who have work to do, to keep from getting sick in the first place. As a matter of fact, we have spent a good deal of our time during the past four days talking about that very thing. During the meetings, and, afterwards, when we go out to lunch together, what is uppermost in our minds is the prevention of sickness among those who work in store and factory. You see, doctors are just like other people; they like to talk about the one thing that interests them most.

"I suppose most people think that a company doctor has his office in the plant so that he can be close at hand just in case some man who works there is seriously hurt. Now, of course, that is a consideration and an important one. There are times when minutes count; when seconds even may mean the difference between life and death. Such moments try men's souls. At a time such as that, one good company doctor counts for more than all the efforts of those who respond to the emergency call, because he is on the spot; he knows his way around the plant, and—what is just as important—he knows the men and he realizes that they trust him.

"Once, or perhaps twice, in a company doctor's working lifetime, a catastrophe comes—swiftly, and without warning. One moment everything is as it should be—the hum of whirling machinery, the old familiar sounds, and the old familiar smells. Then something goes wrong. For a moment time seems to stand still—there is an unfamiliar noise, a brief silence, and then shouts—the voices of men he has known for years, calling for him, the doctor. Believe me, an experience such as that is never forgotten. A good doctor treasures it as a high spot of his working life. And then, even as he glances out the window, men appear from nowhere—blackened beyond recognition. They come running down the road toward him. Will they pass him by, or will they come crowding into his office, suddenly all too small, and then, quietly, without a murmur, stand, each man patiently waiting his turn without a word of complaint. Believe me, moments such as these are, are never to be forgotten. Strange as it may seem, we industrial physicians treasure such memories, hugging to our hearts the thought that, for the time being, we were indispensable.

"And yet, let us not lose sight of the fact, that after all, accidents are the exception—not the rule; that no longer are they the most important part of our work. Nowadays, we spend more time and effort preventing disability than we do in repairing damage already done. There are new manufacturing processes for us to study. Many of them involve the use of new chemicals made for some particular purpose. Others involve the use of old familiar compounds in new and strange ways. Study these problems beforehand as thoroughly as one may, one never knows exactly how the new process will work out in actual production. We can never be sure that, through some unexpected quirk of fate, there may not be some untoward result; that out of a hundred men, one may not prove to be allergic to something. Therefore, we often give the men a special examination before they go on the new job. And after that, we re-examine them from time to time, just to make sure that everything is still as it should be.

"Lastly, for the time is short, all these examinations are worth while for another reason. They keep the doctor in touch with the men in a way that daily walks through the plant can never do. It is one thing to pass the time of day with a man who is at work and has his mind on the job; it is quite another thing to have the foreman take him off the job for half an hour and send him up to the doctor's office. There in the quiet waiting room, and a few minutes later in the white-tiled booth, where he gets ready for the physical examination, a man has a chance to give a little thought to himself; to wonder whether his own body machinery is really in as good shape as it should be. And finally, when the doctor, in the privacy of his examining room, has listened to the man's heart; has had him cough, and has given him a general looking over, and then says: "Joe, you actually are in better shape than you were when you came with us 20 years ago. Why man, you are good for another 20 years at least!"—well, then, the whole idea of having a company doctor right there in the plant really seems worth while."

Dr. Roy R. Jones

THE announcement, on Wednesday morning, that Dr. R. R. Jones, who was scheduled to present the second paper on the A.A.I.P. & S. program, was seriously ill, in Utah, was a matter of grave concern to his many friends; and the hope was unanimously and repeatedly expressed that the news would not prove as ominous as, somehow, it had seemed. But only a few days later came word of his untimely death. The friends who loved him were many; the acquaintances who knew and respected him were legion. All of them will understand the feeling of his associates embodied in the words of Dr. R. R. Sayers: "It is not easy to write about the loss of an individual whose outstanding characteristics were a keen insight into human nature, an intense interest in the welfare of his fellow men, and great personal warmth in all of his relationships. . . .

"The death of Dr. Roy R. Jones in Salt Lake City, on June 13, deprives industrial hygiene of one of its most valuable and devoted workers. At the time of his death, Dr. Jones, discharging his

duties as a Surgeon in the United States Public Health Service, was assisting the state of Utah in preparations for the study of health hazards in the mining and smelter industries with a view to the adoption of control measures.

"ROY R. JONES was born in Frontier City, Nebraska, on October 15, 1890. He was educated at the State University of Iowa, where he received the degree of Bachelor of Science in 1917, and the degree of Doctor of Medicine in 1919. His internship was served at Iowa Methodist Hospital, Des Moines. He conducted a general practice in Iowa City until January, 1921, when he was appointed Canal Zone Physician in the Panama Canal Service. In February, 1924, he returned, to practice medicine in Linden, Iowa. In April, 1927, he reentered government service in the Division of Industrial Hygiene. He was closely associated with most of the major field studies conducted by the Division of Industrial Hygiene from 1927 on. In connection with the Division's epidemiological studies on the relationship of working environment to health, his work, which included the physical examinations of several thousand workmen, resulted in the development of methods for the protection of many thousands of workers in such industries as the lead storage battery industry, anthracite mining, fertilizer industry, fur felt industry, trucking industry, and tunnel construction.

"Generous to a fault, DR. JONES never spared himself at any time during his work with these men and as a result enjoyed their complete confidence and respect. Very often they came to him with their personal problems outside of working hours because they were aware of his deep understanding and interest in them from a personal as well as a professional standpoint.

"The development of health and safety codes stands as one of DR. JONES' most valuable contributions. He served as the representative of the Public Health Service in connection with such groups as the American Standards Association, the National Safety Council, and the Federal Interdepartmental Safety Council. From November, 1935, to March, 1938, DR. JONES was detailed as medical adviser to the Division of Labor Standards, United States Department of Labor. During this time he represented the Department at conferences and on committees which were concerned with the development of standards, laws, and regulations relating to the health of workers.

"In addition to these manifold activities, DR. JONES served as Secretary of the Committee on Medical Control of Silicosis, National Silicosis Conference, and was responsible for the editing of the reports of the Commitee. During the past year, in addition to directing the study of compressed-air illness among tunnel workers, he had been assisting State industrial hygiene units in the development and extension of their industrial health services.

"A simple chronicle of ROY R. JONES' life is sufficient to indicate the worth of the man, but such a chronicle cannot possibly show his fine relationship to his professional colleagues, to the workmen in the various industries, to all of his acquaintances. . . ."

Human Relations in Industry

WILLIAM S. KNUDSEN,
President, General Motors Corporation,
Detroit, Michigan

THE subject, "Human Relations in Industry," is a rather broad one and it would be impossible to cover it in one evening. Our relationship in industry with human beings goes all the way from the customer to the board of directors. Naturally, a corporation as large as ours is only large if it gives service, and if it does not give service it ceases to be large awfully quick.

In our relationship with the customer the first thing is: We must please the customer. Whatever we sell must be sold right, and must perform right after it gets into the hands of the ultimate consumer. If there is something that is not right, then it is our duty to find out as soon as possible what is not right and make it right.

You all remember years ago in the motor car business when *caveat emptor* was the watchword. If you separated from your money, or were separated from your money at the salesroom door, you spent a long time afterwards, more or less cussing, the man who did it. That was in the old days when there was a greater demand for motor cars than the industry could supply. The industry, however, has been progressive enough to learn that from a satisfied customer comes more business. So our relationship with the customer in General Motors is primarily to see that he is satisfied—primarily to see that he is so satisfied that he will be our customer again.

We have even gone a step farther. Nowadays we try to send out questionnaires to find out what the customer might want in his future car. There is a department in Detroit which handles that matter entirely, and we try to get from the trade itself, from the customers themselves, an idea of what is wanted. Some things, of course, we cannot fulfil—you know that—but a trend can be established if we know what the public taste is, particularly what a woman's taste is in motor cars, because we learn, as we have learned little by little, that she plays a very important role, whether in the low-priced field or in the high-priced field of motor cars.

The next step in our relationship with human beings is with the dealer. The dealer, of course, represents us in the field, and him we must know, him we must contact, from him we must find what the problems are in dealing with the public in his particular locality. I am not telling tales out of school if I tell you that, way back in 1926, I took our sales manager with me and said to him one day: "Let us go out and see some dealers." He said, "Where do you want to go?" I said: "I don't particularly care; let's go to Kansas City." So we went out to Kansas City, and we bought an automobile in our branch and started out, and wherever we saw a dealer sign of our particular car—I am not advertising, but it

was a Chevrolet car in those days—we would stop in and call on the dealer. We had quite interesting situations arise, because it was the first time that the president of the company had been out to see a dealer. In some cases they would not believe it. But it soon went around that we were doing this for the good of the dealer and for the good of our business, and today it is standard practice within the corporation that every division manager visits his dealers as often as possible right in their places of business and finds out what the trend is.

Going farther than distribution, the next step is the supplier of material. Naturally, as you know, we do not engage in primary manufacture in General Motors. We buy the primary material, such as steel, iron, copper, brass, and zinc; we buy it either in the rough or partly manufactured. It is quite important also, throughout our relationship with our supplier as such, that we are desirable customers; and I have learned from experience in the earlier years that the best source of material is the one that comes around and sees you every so often, not to ask you for an order, but to ask you how you like his goods. It is awfully good business, and it has been a lesson to me in more instances than one.

THE final step in our human relationship is with the employee, and there is perhaps the most important step in human relationship. The man who works for you first must like to work for you. He must not work for you just because he has to. He must work for you because he likes to work for you. Why? Not for your particular benefit, but for the benefit of the job that he is working on. A satisfied employee will always do better work, and quality can only be gotten from satisfied employees.

Much was said a few years back about the automobile industry having horns, and many comparisons were made between the automobile industry and such things as the Triangle Shirtwaist fire. I think I ought to be frank enough to state that in the automobile industry we have always tried to have our shops as healthy, clean and up-to-date as human endeavor and experience can make possible. Why? Because it is good business. You can get better work in a clean shop, just as you get better work out of good equipment, better work out of better tools.

Starting with the premise that you have the best plant, the best equipment, the best tools, sanitary working conditions, then comes the health of the employee, because a man who is sick does not do good work. He cannot. A man who is hurt is scared for a while after. Out of all this came the department of industrial medicine in industry, which today is ranking as one of the most important departments in the production set-up.

I should, perhaps, tell you that I myself, in my young days, was what we then called a shop doctor. I was a young assistant superintendent in an old fashioned plant with about six or seven hundred employees. We had a general line of press work and screw machine parts and parts for bicycles, and hardware. From there we graduated into the automobile industry through the parts route, and were finally purchased by one of the larger factories, and I became connected with the automobile industry through that sale. But to go back to my function, we had no doctor in the plant. We had what was called a company doctor who lived four or five miles away from the plant, and we had no automobiles, so whenever anybody was hurt we had to take him on the street car. Of course we could not take him on the street car without tying him up in some fashion or other, and I was given an education on how to tie up wounds. We had a cabinet down in the engine room, and when anybody was hurt a couple of fellows would take him there and I would clean him up as well as I could, and then take him down to the doctor.

Well, it wasn't very satisfactory. In the first place, infections were hard to prevent, due to the distance that had to be travelled before the wound was thoroughly cleaned, and I am frank to say that as soon as we got connected with the automobile industry, in that same plant, before I moved to Detroit, a physician made his appearance on the job. We rigged him up a little first aid department, and from then on I have seen it grow—until today I can say I am proud of what industry has done to take care of its people, not only as to accidents and occupational diseases, but also as to what they are doing now, looking after health in a general way.

I THINK that perhaps industrial medicine is the newest in the medical specialties. It was brought into being largely through legislation and workmen's compensation for injuries and occupational diseases, but it is also fair to say that it is due to an increasing consciousness on the part of the employer with regard to the welfare of his men. It is a highly satisfactory field, because its best results come about through prevention. Practically all occupational diseases are preventable by intelligent use of facilities, such as ventilation, clothing, respirators, etc. Preventive medicine is in the forefront of the practice of medicine today. It is certainly easier and better for all concerned to prevent disease rather than only attempt to cure it. The purely surgical side of industrial medicine is of somewhat less importance today than formerly. Industrial hygiene aspects have become more important.

To digress a moment, since we have the modern medical departments in the shop, the so-called lame back that we heard so much about in years gone past has rather disappeared from the picture. I remember the shop doctor in the old days telling me that there were two things he absolutely could not prove were simulated, and one was a headache and the other a lame back. But it seems that now we have a pill to give for headache, and for the lame back—I do not know how it has come about, but I do not hear about it very

much lately. So at every step progress has been made. I remember many times in my early years we were duobtful about it when at one time by lifting a box a man would get a lame back, and at another time he could lift the same box and not get a lame back.

Absenteeism due to sickness and accidents on the average amounts to more than 10 days per year per employee. Occupational diseases and accidents cause less than one-half of one of these 10 days' absence. In other words, ordinary disease such as prevails in the community is responsible for nearly 20 times as much loss of time as trade hazards and industrial accidents combined. I am indebted for this statement to Dr. Heiser, who I understand is in the audience. It has always been a great pleasure to contact Dr. Heiser and read his books, because he has so much of that supreme quality of Americanism called common sense.

Particular emphasis should be given to cutting down the ordinary disease rate among workers. It is not unreasonable to expect that by attacking the conditions which are responsible for 95% of the absenteeism, a great reduction could be made that would be profitable to the employer as well as the employee. Up to the present time the emphasis has been entirely upon occupational hazards, and they are only responsible for 5% of the absenteeism.

I think here we should give credit to the National Safety Council, which was one of the first to install a system whereby we had a thorough record of industrial accidents. By this and other similar influences, including thoroughly trained government supervision in the causes of accidents, the present result has been obtained. I am quite frank to say that, as far as the world is concerned, we in America stand higher than any other place, to the best of my knowledge.

A question is given to me: What, in your opinion, should industry expect of the plant physician?

Industry has in the plant physician, according to my humble opinion, a consulting engineer. I think a plant physician should be thoroughly familiar with every department in the plant, with all the hazards that prevail in the operation of the machinery, and on top of that should give an over-all survey to the general conditions of the men in the plant so that if there is anything the employer can do to improve the general result such things can be specified and promptly acted upon. I do not look upon the plant physician as part of the operating picture. I cannot give him an operation sheet and say that he must do so and so every day. That is impossible. His mission is one of consultation. His field is a much broader one than could be specified on an operation chart. His ability to go out amongst the men and find out what is on their minds is extremely valuable to the management of the plant. Contrariwise, if he does not know how to contact his people he might actually do harm.

Another field in which I think the plant physician can do a great deal of good is, if his contact with the men in the plant is close enough, he can then advise them how to obtain treatment from an outside physician for such things as bother them. I never saw a man yet who was not willing to tell you all his ailments if he only had the right sympathetic ear to tell them to. I consider that very, very important. Sometimes the man does not know what is wrong with him. Perhaps his plant doctor can advise him of a place where he can go and have his case diagnosed properly and in that way make him happier.

According to data supplied by the United States Department of Labor the direct and indirect costs of industrial injuries in this country are approximately five billion dollars annually. This estimate does not include the economic losses due to non-industrial injuries and illnesses, which we know are far in excess of specific occupational disease and accidents.

During 1938 our plant physicians reported a total of 451 occupational disease cases. However, only 10 of them lost time. Of the 451 cases, 413 involved dermatitis, and during the year the corporation had an average of 125,836 employees on the hourly rate payroll.

WE HAVE spent over eight and a half million dollars in the last two years purely on health for the employees, in order to protect their health and to improve their health. I consider this money well spent.

There is a tremendous disparity between medical services in large and small plants. Roughly speaking, of the 50 million persons gainfully employed in the United States, about 30 million are in industry. Of these about half are in the large factories, offices, railways, and public service units. The other 15 million are in plants or industries employing fewer than 500 persons. According to the survey made by the American College of Surgeons, about 80% of the larger industries have reasonably good medical service, but the majority of the smaller industries have no well organized medical service.

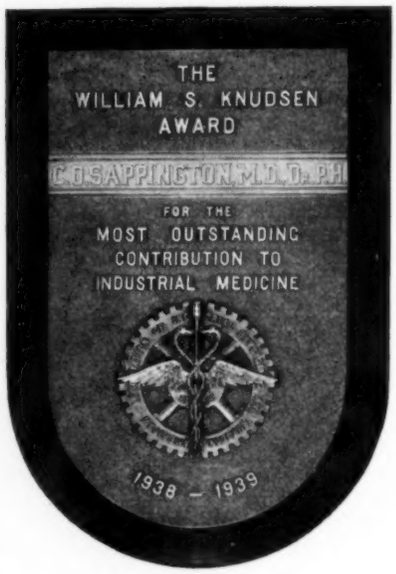
I am asked to discuss the relationship of the plant medical service and community life, especially as to the medical profession. I do not know quite how to answer that. I feel that the plant physician in a plant city should know his colleague doctors in a community and contact them often, to find out or to exchange information regarding disease conditions in the community. Certainly if any disease threatens a locality the quicker the plant that employs a large number of people finds out about it the better protective measures can be taken. The medical profession should feel that in the plant doctor they have a real cooperative medium, a place where they can check, and a place where the plant doctor can check, on the health conditions of the community. I presume this is a rather unsatisfactory answer, but I cannot think of any other for the moment.

According to the American Medical Association, 15% of industry is served by full-time physicians,

and 85% by general practitioners. The number of physicians serving industry on a full or part-time basis has doubled in the last five years. The membership in your association has increased 300% in three years, and there are more than 1000 members at the present time.

Here comes the business side of it. A number of industries reporting to a national association stated that since the introduction of a medical division the accident rate had decreased 46.6%, with a 28.7% reduction in compensation payments, and that absenteeism was reduced 50.6%. There, to my mind, rests the answer to the query as to the importance of the plant physician. I feel that losses in a factory, losses of operating time for any cause, are expensive. That expense eventually comes out of the price of the product, but if you can reduce stoppages and losses to a minimum from any cause, then you have accomplished something for industry at large, and for the consumer as well.

I am asked: What methods should the plant physician use to make his service most useful to the employees? I should say by getting acquainted with as many of them as possible; that is my only answer. If the employee has confidence in the plant physician he will soon hunt him up; he will not have to hunt the employee up. But the first thing is to instil confidence in the men as to his ability and sincerity in trying to help them. The best by-product of a good medical program is the good will of the employee. The plant doctor who enjoys the confidence of the workmen is in a unique position to promote a better employer - employee relationship.



My last point is this: The doctor in the plant performs a function which cannot be underestimated. He should have the confidence of the management. He should have no position on the organization charts, so to speak, but should be given the proper freedom to bring to the management his observations rather than their demand. If that can be accomplished—and I am sure it is being accomplished as far as we are concerned—I am sure that industry in general will recognize that that is the proper way to handle the physician's work in the plant.

I feel that perhaps the loss of time that we have had through illness or even through accident or occupational diseases can be reduced a little further, with a better effect on quality and a better effect on cost.

I wish to say a few words here about our mission in industry, when we talk about serving the public. It is our duty to make the best possible product at the lowest possible cost. Anything that we can do to accomplish that object should be done, and we will then be able to give better service, and if we do that we will stay in business longer.

The Knudsen Award

—And the Book, "Medicolegal Phases of Occupational Diseases," on the Basis of Which the Award Was Given—

AT THE Twenty-Third Annual Meeting of the American Association of Industrial Physicians and Surgeons at Chicago, in June, 1938, it was announced that WILLIAM S. KNUDSEN, President of General Motors Corporation, Detroit, had established the WILLIAM S. KNUDSEN AWARD to be given in 1939, and yearly thereafter, to the member of the Association making the most outstanding contribution to industrial medicine during the year.* DR. C. D. SELBY, President of the Association, then appointed the KNUDSEN AWARD Committee, of which DR. LOYAL A. SHOUDY was Chairman, and DRS. MCIVER WOODY and C. F. N. SCHRAM were the other members. A number of books and scientific studies were submitted by their respective authors and received due consideration by the Committee.

With full authority in all respects concerning the AWARD, the Committee elected to make no announcement about it prior to the actual presentation at the Twenty-Fourth Annual Meeting of the Association at Cleveland in June, 1939. Accordingly, the name of the recipient was not known until, at the Annual Banquet, at 6:30 P.M. on Wednesday, June 7, DR. C. O. SAPPINGTON was seated beside MR. KNUDSEN at the speakers' table. At the conclusion of his talk on "Human Relations in Industry" (see p. 307), MR. KNUDSEN said:

"Now, I have a mission to perform here tonight. I have an Award to give to DR. C. O. SAPPINGTON, Consultant in Occupational Diseases and Industrial Hygiene. DR. SAPPINGTON was formerly Director of Industrial Health, National Safety Council, and formerly special lecturer on industrial hygiene and occupational diseases at the University of California, Stanford Medical School, University of Michigan, University of Illinois Medical School and Rush Medical College. I feel a bit embarrassed because I happen to be the donor of this Award, and someone else really should have given it to DR. SAPPINGTON. However, in self defense I will say that the Award was made by DR. SHOUDY, DR. WOODY, and DR. SCHRAM.

* See INDUSTRIAL MEDICINE, August, 1938, p. 517.

"So, DR. SAPPINGTON, I have the extreme honor, on behalf of the Committee, to bestow upon you the KNUDSEN AWARD for the most outstanding contribution to industrial medicine for the year 1938-1939."

DR. SAPPINGTON replied:

"MR. KNUDSEN, DR. SELBY, Members and Guests of the Association: It is impossible for me to find words that will adequately express my deep appreciation of this honor. However, in a few sentences I should like to attempt to interpret what seems to me to be the significance of this occasion, because it is far more than the recognition of mere personal accomplishment.

"It seems to me that it means that a great industry and a great association of medical men have realized that the two groups have a common ground of objectives and purposes, and that through this mutuality it is possible for them to provide the basis for recognition and encouragement which is vital to progress.

"Therefore, I take this occasion to congratulate you, MR. KNUDSEN, and you, DR. SELBY, and the members of your respective organizations, on the practical idealism which is exemplified by the establishment of this AWARD, and I bespeak for you in future years the great returns in satisfaction in the association which this AWARD will bring. Thank you."

DR. SELBY then congratulated DR. SAPPINGTON, and said:

"DR. SAPPINGTON was awarded this plaque in return for the contribution he has made to the literature of industrial medicine, in his book entitled 'Medicolegal Phases of Occupational Diseases.'"

THE AWARD is represented by the plaque illustrated on page 310. DR. SAPPINGTON is well known in the field of industrial medicine, in both its medical and medicolegal phases. In addition to the many duties and responsibilities of his work as Consultant in Occupational Diseases and Industrial Hygiene, he has been known to our readers as Consultant Editor of INDUSTRIAL MEDICINE since its establishment in June, 1932. His new book, which was the basis of the AWARD, may be described, in brief review, as follows:

MEDICOLEGAL PHASES OF OCCUPATIONAL DISEASES, by C. O. SAPPINGTON, M.D., DR.P.H. An outline of Theory and Practice—presenting, in handbook form, the Industrial, Insurance, Medical, and Legal inter-relations of all the elements of Occupational Diseases, from Origins and Causes, to Disabilities and Costs. 400 pages; 5¾ x 7¾; bound in cloth (or semi-flexible, as preferred). Price $2.75 (cloth). Published by INDUSTRIAL HEALTH BOOK COMPANY, 540 North Michigan Ave., Chicago, Illinois.

THIS BOOK is particularly opportune, as industrial health, industrial hygiene, industrial medicine and occupational diseases are being stressed at the present time and involve numerous difficult problems. As the author says in the preface: "Although growing emphasis placed on the problems involved in occupational diseases has given great impetus to the study of causes, clinical manifestations, laboratory findings and control measures, the *lack of use* of these methods and the *misuse* of information resulting from them, still present difficulties. The chief sources of such difficulties arise from a lack of true appreciation of the necessity of establishing definite *cause-and-effect* relationships between employment, disease, and disability, and the common mistake of permitting the error in reasoning which Kant so memorably expressed as *'Post hoc ergo propter hos'* ('After this, therefore on account of this')."

The material of the book has been divided into four parts: INDUSTRIAL, INSURANCE, MEDICAL, and LEGAL, and the relationships of the personnel of each of these divisions are shown throughout the text, indicating the necessity of the business executive, the insurance carrier, the industrial physician, and the lawyer cooperating in the solution of common problems.

The chapter headings offer a picture of the information contained in this volume:

PART I: INDUSTRIAL, covering Causes of Occupational Diseases — Standards of Permissible Exposures — Industrial Dusts — Gases and Vapors — Volatile Solvents — Skin Irritants — The Working Environment — Field and Laboratory Methods — Control of Occupational Exposures — The Cost of Occupational Diseases;

PART II: INSURANCE: Specific Approach Necessary — Information Needed and Methods Available — Some Practical Problems — The Importance of Prevention;

PART III: MEDICAL: Occupational Diseases — Occupational Poisonings—Other Occupational Effects — Diagnosis — Estimation of Disability — Treatment — Prevention;

PART IV: LEGAL: Compensation Experience — Occupational Disease Disability Laws — Difference between "Accidents" and Diseases — Medicolegal Evidence — Present Methods of Adjudication —The Physician as a Witness—Other Professional Witnesses—Legal Decisions—Present and Future Trends of Occupational Disease Disability Legislation.

The author has presented the material in clear and concise language, indicating the coordination of the extensive and complicated factors of the field of industrial hygiene and occupational diseases. Each part consists of an introduction, and chapter texts, followed by a summary and list of references for that particular part.

There is an excellent Appendix, including Occupational Record, Abstracts of State Laws, Scheduled Diseases, Abstracts of Legal Decisions, Legislative Suggestions of the American Bar Association, Suggested Schedule Law recommended by the American Public Health Association, and a Digest of Workmen's Compensation Laws by States. Twenty-nine tables illuminate the text to good advantage, as well as illustrations of some of the apparatus used in industrial hygiene activities. The book is especially well indexed.

The industrial physician will find valuable data

in this volume. It will prove a useful guide to him in the medical control of occupational hazards and diseases in his plant work. And it will assist him in his cooperative relationships with company executives, industrial hygienists, and plant and safety engineers. The book is of definite special help in the evaluation of the etiologic factors of occupational disease problems.

Constitution and By-Laws

THE Board of Directors, meeting on June 4, adopted certain amendments to the Constitution and By-Laws of the A. A. I. P. & S., and recommended their ratification by the members. In submitting these to the members, on June 7, DR. VOLNEY S. CHENEY referred to them as having been published in INDUSTRIAL MEDICINE (May, 1939, pp. 202) and summarized them as authorizing: (1) the employment of an Executive Secretary for the Association; (2) the creation and incorporation of a Board of Examiners for the certification of industrial physicians; (3) the establishment of an Executive Committee; (4) and the affiliation of groups or organizations of physicians or laymen whose work and activities are closely allied to industrial medicine.

These amendments having been duly adopted by vote of the membership, the CONSTITUTION and BY-LAWS of the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS are now as follows:

CONSTITUTION

Adopted June 7, 1939.

Article I — Name

THE name and title of this organization shall be The American Association of Industrial Physicians and Surgeons.

Article II — Object

THE object of this Association shall be to foster the study and discussion of the problems peculiar to the practice of industrial medicine and surgery; to develop methods adapted to the conservation and improvement of health among workers in industries; to promote a more general understanding of the purposes and results of the medical care of employees, and to unite into one organization members of the medical profession specializing in industrial medicine and surgery for their mutual advancement in the practice of their profession.

Article III — Membership

SECTION 1. Membership in ths Association shall be of four classes: (a) Fellow, (b) Active, (c) Associate, and (d) Honorary. Only physicians who are actively engaged in the practice of industrial medicine and surgery or who are engaged in the investigation of industrial medical problems shall be eligible to Active Membership; other physicians shall be eligible to Associate Membership. Any person who has contributed distinguished service to the objects for which the Association stands shall be eligible to Honorary Membership.

Sec. 2. Associate and Honorary members shall have all the privileges of Fellows and Active Members, except the privileges of holding office and voting for officers and directors or for amendments to the Constitution and By-Laws.

Sec. 3. Applications for Active or Associate Membership must be made in writing to the Secretary-Treasurer; be accompanied by the fee for the annual dues; approved by a Fellow or an Active Member in good standing, and be certified by the Secretary of applicant's local county medical society that he is ethical and in good standing in his local county medical society. Applications shall not be acted upon by the Board of Directors unless they have first been approved by a Committee of three, to be appointed by the President. Honorary Membership may be conferred upon physicians who have made some definite contribution toward the advancement of Industrial Medicine and Surgery or who have performed some special service for the Association. Proposals for Honorary Membership shall be made to the Secretary-Treasurer in writing for consideration by the Board of Directors.

Sec. 4. A two-thirds vote of the Board of Directors shall be required to elect to any class of membership.

Article IV — Fellowship

SECTION 1. Active members after three years of membership in the Association may apply for Fellowship.

Sec. 2. Fellowship shall be conferred by the Board of Directors upon those applicants who satisfactorily and successfully pass an examination by the Board of Examiners.

Sec. 3. A suitable certificate will be issued by the Secretary to those upon whom Fellowship has been conferred.

Article V — Officers and Directors

SECTION 1. The officers of this Association shall be a President, a President-Elect, a First Vice-President, a Second Vice-President, and a Secretary-Treasurer. They shall be Fellows of the Association and shall be elected by the Association and shall serve from the close of the Annual Meeting until their successors are elected and installed.

Sec. 2. An Executive Secretary shall be appointed by the Board of Directors. He can be either a physician or layman and shall hold his office from year to year at the pleasure of the Board of Directors.

Sec. 3. The affairs of the Association shall be administered by a Board of Directors, consisting of the officers and twelve directors. Presidents of component societies shall be ex-officio members of the Board of Directors with the same powers as other directors. Only Fellows shall be eligible to serve on the Board of Directors.

Sec. 4. The planning of the work of the Association, arrangements for meetings and programs and for other matters pertaining to the administration of its affairs, shall be vested in the Board of Directors, except as otherwise herein expressly provided. The President of the Association shall serve as Chairman of the Board. The Board shall make its own rules, and it and the President shall appoint such committees for carrying out the work as they shall deem necessary and advisable.

Sec. 5. Executive Committee: The five officers of the Association shall constitute an Executive Committee.

Sec. 6. The Board of Examiners shall consist of five members or Fellows; and shall be incorporated under the laws of the State of Illinois and shall be appointed by the Board of Directors. Their tenure of office shall be subject to the pleasure of the Board of Directors.

Article VI — District Branches or Councils

SECTION 1. The Board of Directors shall have the power to take the necessary steps for organizing or admitting local district Branches or Councils of the Association.

Sec. 2. A local organization of Industrial Physicians and Surgeons already established and consisting of not less than twenty-five members may become a component society and its members admitted to full active membership of this Association by making application therefor with a certification from their President and Secretary that their members meet all our requirements for membership; have been carefully chosen, and are all members in good standing of their local county medical society. Dues per member for current fiscal year and a copy of Constitution and By-Laws must accompany application.

Sec. 3. Any local or national organization of laymen or of another profession whose work and activities are closely allied to industrial medicine may become an affliated society under conditions set up by the Board of Directors.

Article VII — Amendments

SECTION 1. This Constitution may be amended by a

three-fourths vote of the members present and voting at any annual meeting of the Association provided that notice of proposed amendments must be given by publication in the official Journal of the Association at least thirty days before the date set for the meeting.

BY-LAWS

Adopted June 7, 1939.

Article I — Meetings

SECTION 1. The Annual Meeting of the Association shall be held at the time and place selected by the Board of Directors. Fifty members and Fellows shall constitute a quorum.

Sec. 2. Special meetings may be called by the President with the approval of five members of the Board of Directors.

Sec. 3. Notice of all meetings shall be sent to the members by the Secretary-Treasurer at least thirty days in advance of the date set for them.

Sec. 4. Each member of the Board of Directors shall be notified in writing by the Secretary-Treasurer at least two weeks in advance, as to the time, place and purpose of a meeting of the Board of Directors. Nine Directors shall constitute a quorum.

Article II — Dues

SECTION 1. The annual dues of active and associate members shall be Five Dollars per year and of Fellows shall be Ten Dollars per year. Dues of members of component and affiliated societies shall be determined by the Executive Committee. Dues shall be payable in advance on the first day of January of each year. Honorary members shall pay no dues.

Sec. 2. Any member or Fellow whose dues are unpaid is not in good standing, and he shall have no vote until his indebtedness is discharged. When the dues of any member shall not be paid during the fiscal year his membership shall automatically cease.

Sec. 3. Any member or Fellow dropped for non-payment of dues may be reinstated at any time previous to the convening of the Annual Meeting of the year following his delinquency by payment of dues in arrears and also the dues for the current year.

Article III — Election of Officers and Directors

SECTION 1. Nominations for officers and directors shall be made by a nominating committee of three Fellows to be appointed by the President at the first executive session of any Annual Meeting. Provided, this article shall not be construed so as to deprive any member of his right to make nominations from the floor.

Sec. 2. Election of officers and directors shall take place at the last executive session of the Annual Meeting.

Sec. 3. At each Annual Meeting there shall be elected to the Board of Directors five Fellows to serve for a term of two years. Upon expiraton of the term of office of the President he shall became automatically a member of the Board of Directors to serve for two years.

Sec. 4. In the event of there being competitive nominations for any office, election shall be by ballot, and a majority of all votes cast shall be required to elect. If after two ballots there shall be no election, all but the two candidates receiving the highest number of votes shall be dropped from the ballot and the voting confined to the two so designated.

Sec. 5. The Board of Directors shall have power to fill vacancies among the officers and directors to serve until the next Annual Meeting of the Association or until their successors are elected and installed.

Article IV — Duties of Officers

SECTION 1. The President shall preside at all meetings of the Association and of the Board of Directors and shall perform such other duties as may be directed by the Board of Directors. He shall also be ex-officio member of all committees. In the absence of the President, the President-Elect or a Vice-President shall act in his place.

Sec. 2. The Secretary-Treasurer shall be the custodian of all monies of the Association and shall pay all just bills against the Association subject to the approval of the Board of Directors; he shall submit his accounts, audited by a Certified Public Accountant, to the Board of Directors at the Annual Meeting and shall transmit to his successor in office all funds and property of the Association remaining in his possession. He shall submit an annual report to the Association in such form as may be determined by the Board of Directors. He shall be bonded in such an amount as shall be determined by the Board of Directors from year to year and in a company approved by the Board of Directors. Expense of bond shall be borne by the Association.

Sec. 3. The Executive Secretary shall keep an accurate record of all the transactions of all meetings of the Association and of the Board of Directors; shall carry on the correspondence of the Association; shall keep an accurate list of the Fellows and members, which shall show their status in the Association; shall receive all monies belonging to the Association, giving receipt therefor, and turning them over to the custody of the Secretary-Treasurer. He shall be under the direct supervision of the Secretary-Treasurer to whom he shall make all reports. He shall be paid a yearly salary, the amount to be determined by the Board of Directors. He shall be bonded.

Sec. 4. The Executive Committee shall transact the duties of the Board of Directors in emergencies or in any special assignment from the Board of Directors. It shall pass upon the application of component and affiliated societies and complete arrangements for their admission into the Association. Its actions shall be subject to the approval of the Board of Directors.

Sec. 5. The Board of Examiners shall hold regular meetings at least once a year, for the purpose of examining applicants for Fellowship and shall certify the results of the examinations to the Board of Directors.

Article V — Committees

SECTION 1. The President shall appoint a program committee consisting of two or more Fellows or active members and the Secretary-Treasurer as a member ex-officio, whose duty it shall be to provide the program for each meeting of the Association.

Sec. 2. The President shall appoint other committees as the Association or Board of Directors may recommend or at his own discretion for any special purpose pertaining to the Association or its activities.

Sec. 3. The President shall appoint a membership committee of three Fellows, whose duty it shall be to investigate and pass upon all applications for membership before they are referred to the Board of Directors for their consideration.

Article VI

SECTION 1. All resolutions shall be referred to appropriate committees for recommendation before submitting them to the Association.

Sec. 2. A Fellow or member may be expelled for such cause as the Board of Directors may deem sufficient; provided, that a copy of the charge made against him shall be furnished to him in writing at least thirty days before the meeting at which such action is taken. A three-fourths vote of all members of the Board of Directors shall be required to expel a member of the Association.

Article VII — Amendments

SECTION 1. These By-Laws may be amended by a majority vote of the members present and voting at any Annual Meeting of the Association; provided, that notice of proposed amendments must be given by publication in the official Journal of the Association at least thirty days before the date set for the meeting.

New Officers and Directors

THE election of officers, on Thursday, June 8, 1939, resulted as follows:

President—DR. MCIVER WOODY, Medical Director, Standard Oil Company of New Jersey, New York City.

President-Elect—DR. DANIEL L. LYNCH, Medical

Director, New England Telephone & Telegraph Company, Boston.

First Vice-President—DR. LLOYD NOLAND, Medical Director, Tennessee Coal, Iron & Railroad Company, Fairfield, Alabama.

Second Vice-President—DR. T. LYLE HAZLETT, Medical Director, Westinghouse Electric & Manufacturing Company, Pittsburgh.

Secretary-Treasurer — DR. VOLNEY S. CHENEY, Medical Director, Armour and Company, Chicago.

The Directors for the term 1939-1941 were chosen as follows:

DR. EDWARD C. HOLMBLAD, Railway Express Agency, Chicago.

DR. WILLIAM A. SAWYER, Medical Director, Eastman Kodak Company, Rochester, New York.

DR. JOHN J. PRENDERGAST, Medical Director, Chrysler Corporation, Detroit.

DR. CLARENCE D. SELBY, Medical Consultant, General Motors Corporation, Detroit.

DR. HARVEY BARTLE, Chief Medical Examiner, Pennsylvania Railroad, Philadelphia.

DR. R. C. ENGEL, Chief Surgeon, Republic Steel Corporation, Cleveland Division, Cleveland, Ohio.

The Directors whose terms continue over to 1940, and the new Committees for 1939-1940 are listed on page 2 of the front section of this issue.

Exhibitors at Cleveland

THE Exhibitors, whose displays of products and capable representation in personnel added to the interest and friendliness of the Convention days, were as follows:

A. S. Aloe Company, 1813 Olive St., St. Louis, Mo.
American Optical Company, 10 S. Wabash Ave., Chicago.
American Sterilizer Co., Erie, Penna.
Bell & Howell, 1801-05 Larchmont Ave., Chicago.
Brooks Appliance Co., 5 N. Wabash Ave., Chicago.
The Cameron Heartometer & Surgical Specialty Company, 666 W. Division St., Chicago.
Burroughs Wellcome & Company, 9 & 11 East 41st St., New York, N. Y.
The Denver Chemical Mfg. Co., 163 Varick St., New York, N. Y.
Dionol Company, 4210 Trumbull Ave., Detroit, Mich.
Doak Company, Inc., 2132 East 9th St., Cleveland, Ohio.
E & J Company, Drexel Bldg., Philadelphia, Pa.
Eli Lilly and Company, Indianapolis, Ind.
Emerson Drug Company, Baltimore, Md.
Ex-Cello Corporation (Pure-Pak), 1200 Oakmon Blvd., Detroit, Mich.
Farnsworth Laboratories, 28 E. Jackson Blvd., Chicago.
C. B. Fleet Co., 921-27 Commerce St., Lynchburg, Va.
Gebauer Chemical Company, 9410 St. Catherine Ave., Cleveland, Ohio.
Gem Sterilizer, 1811 Moulton Ave., Cleveland, Ohio.
General Electric X-Ray Corporation, 2012 Jackson Blvd., Chicago.
Hanovia Chemical & Mfg. Company, Chestnut St. and N.J.R.R. Ave., Newark, N. J.
Hynson, Westcott & Dunning, Baltimore, Md.
Jones Surgical Supply Company, 800 Huron Road, Cleveland, Ohio.
Liebel-Flarsheim, 303 W. 3rd St., Cincinnati, Ohio.
Maico Company, Minneapolis, Minn.
Martindale Electric Co., Box 617, Edgewater Branch, Cleveland, Ohio.
Merck & Co., Inc., Rahway, N. J.
Petrolagar Labs., Inc., 8134 McCormick Blvd., Chicago.
Mine Safety Appliances, Braddock, Thomas and Meade Sts., Pittsburgh, Pa.
Philip Morris, 119 Fifth Ave., New York, N. J.
Physicians' Record Company, 161 W. Harrison St., Chicago.
Picker X-Ray Corporation, 300 Fourth Ave., New York.
Safety Equipment Service Co., 1228 St. Clair Ave., N. E., Cleveland, Ohio.
Westinghouse X-Ray Company, Inc., Long Island City, N. Y.

Dr. Harvey Honored

TO ANDREW M. HARVEY, M.D., F. A. C. S., and *Dean Emeritus* of Industrial Medicine, on June 14, 1939, from Knox College, at Galesburg, Illinois, came the honorary degree of Doctor of Science. The occasion was the fiftieth anniversary of DR. HARVEY'S graduation there, in 1889; the background was summarized in the citation read by JOHN DEVRIES, Associate Professor of Chemistry:

"On the golden anniversary of his graduation from Knox College, I have the honor to present for the degree of Doctor of Science a man who has distinguished himself as a pioneer in the field of industrial health and safety. After graduation from Knox in 1889 he studied medicine at the universities of Illinois and Michigan. His contributions to the field of medicine have been of a most unselfish nature, and as a surgeon he has proved to be a significant figure among the members of his profession. It is my pleasure to present ANDREW M. HARVEY."

Less formal, just as vivid, the words of Knox President, CARTER DAVIDSON: " . . . One of the finest friends of Knox. . . . established a loan fund to help Chicago students and others attend this institution. . . . Very much interested in the development of our college health service, which is now one of the finest in the Middle West, having a full-time physician and two full-time graduate nurses constantly in attendance upon the student body of 600. . . . An outstanding undergraduate leader, and you know of the real distinction of his career since graduation."

DR. HARVEY'S career in industrial medicine began 43 years ago last month; on June 1, 1896, he became identified with Crane Co's. Medical Department, in Chicago. If not indeed the first M.D. to become Medical Director of an industry, he has other "firsts" to his credit. He was the man who first urged the formation of what is now the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS. Joined quickly by many others, he — and they — saw their ideas crystallized and launched into importance at Detroit, in 1916. He was the first President of Chicago Safety Council; a member of the first board of directors of National Safety Council. "WHO'S WHO IN INDUSTRIAL MEDICINE" holds him: "Distinguished as a pioneer in industrial medicine and surgery, and in industrial hygiene and safety, and for his organizing work in improving the quality of the medical and surgical services available to industrial employees." Most recent "first" — Doctor of Science, for a career in industrial medicine.

Industrial Fatigue

— *and the Physiology of Man at Work* —

D. B. Dill,
From the Fatigue Laboratory, Morgan Hall, Harvard University, Boston

FATIGUE may be experienced by man in his everyday life whether on the farm or in the factory, in deep mines or in high altitudes, in winter's cold or summer's heat, in the dry desert or in the humid jungle.* It is a complaint as common in the office as in the shop. Yet when one attempts to define fatigue in simple terms difficulties arise. It is a safe assumption, for example, that the fatigue of the steel worker has little in common with that experienced by the typist in an air-conditioned office. As has been pointed out on previous occasions, a word that can be used to embrace all the phenomena suggested above, as well as changes undergone by metals under stress, however useful in table talk, is a source of bewilderment to the scientist. Perhaps at this point I should defend the use of the word in the title of our laboratory. While I think it is fair to say that none of us appreciated the vagueness of the term when the laboratory was established in 1927, there is the advantage that physiologists who work in our laboratory find themselves untrammeled: the Fatigue Laboratory has been able to spread its wings over a diverse brood of scientific investigations that include, for example:

Blood as a Physicochemical System;
Mechanisms for Dissipating Heat in Man and Dog;
Heat Cramps;
The Economy of Muscular Exercise;
Life, Heat and Altitude;
New Records in Human Power, and
An Experimental Study of Physical Fitness in Relation to Age.

Diverse as these titles appear, no great cleverness is required to demonstrate the relation of any one of them (or of a hundred others) to the subject of fatigue.

Without further introduction I propose to proceed with a discussion of the physiology of man at work, with particular attention to situations where fatigue is encountered. Principles will be reviewed and recent developments emphasized.

IN physiological terms, the work of man consists of the transformation of chemical energy, supplied to the body as carbohydrate, protein, and fat, to mechanical energy and heat. The amount of energy transformed is about 2,500 kilogram-calories per day in the office worker and not much more than twice that in the man doing the heaviest industrial labor. About 1600-1800 kilogram-calories per day is the minimum energy transformation required for life with no external work. The increment may be 800 kilogram-calories in the office worker and four times as much in the man doing heavy work. From an engineer's point of view, the mechanical efficiency may be 20% under the most favorable conditions, but it is zero in man at rest. In other words the laborer may conceivably have an efficiency of 20% while he is at work but if the energy expenditure during rest is taken into account, the 24-hour efficiency is not much more than 10%. The farmer faces a similar question in deciding on horse or tractor: the horse may be the cheaper prime mover while at work but proper account must be taken of feeding him on idle days.

One of the simplest conceptions of fatigue is that fuel supply may not keep pace with the demand for energy transformation. Physiologists have proved that fat is a less efficient fuel than carbohydrate and it also appears that carbohydrate can be mobilized more rapidly than fat. In other words, when an abundant supply of carbohydrate is available not only is work carried on more efficiently but a higher level of energy exchange can be reached.[1] It is simple to demonstrate in the laboratory the validity of these statements. If a man works near his capacity on the bicycle ergometer he can continue twice as long if he has been on a high carbohydrate diet as if his diet has been principally fat. In some of our experiments on normal dogs running on the treadmill the dog was willing to run four times as long (17 hours vs. 4 hours) when glucose was supplied as when he depended on his own fuel. He ran without glucose with enthusiasm for two or three hours, but by this time his store of carbohydrate was depleted and his blood sugar was low; after another hour or so he quit in an exhausted state with a blood sugar of 50 to 60.

While shortage of fuel may lead to fatigue and eventual breakdown in strenuous activity I doubt whether great inroads are made on fuel reserves in the well-nourished workmen. We failed to find acetone in the urine (the classical test for preponderance of fat in the fuel mixture) of a considerable number of steel workers at the end of their day's work. This can be taken as good evidence for the adequacy of carbohydrate reserves. Their hearty meals, usually containing large quantities of starch, supply them with carbohydrate about as fast as needed during work.

In opposition to this opinion stand the experiments of Haggard and Greenberg described in their book "Diet and Physical Efficiency."[1] They found that the output of shoe workers was greater when they were supplied with free mid-forenoon and mid-afternoon snacks. This is not a suitable occasion to review their laboratory studies of the relation of mechanical efficiency to diet; it is enough to say that subsequent studies by Haldi and associates[2] have not substantiated them. While there is no reason to doubt the observation that more shoes were made when extra food was supplied, it seems likely that psychological rather than physiological factors were of predominant influence: perhaps the increased output was a token of appreciation.

* Presented at the Twenty-Fourth Annual Meeting of the American Association of Industrial Physicians and Surgeons with the American Conference on Occupational Diseases and Industrial Hygiene, Cleveland, June 5, 1939.

While I am unconvinced of the gain from extra fuel between meals under ordinary conditions I have no doubt that occasions may arise when readily available fuel, such as glucose, is useful. Glucose, or dextrose as it is also known, is the sugar of the blood, requires no digestion, and so becomes available soon after its ingestion. It is now produced in pure form from cornstarch and while it has for long been a constituent of candy is now finding many other uses. Many mills supply their workmen with glucose tablets and many marathoners have carried with them packets of glucose tablets to use while running. There are many possible emergencies that require a rate of energy exchange so great that ordinary food might fail to digest but in which glucose might be fully absorbed. It is in fights against fires and floods and in war itself that such a situation is most apt to arise. In this connection I have been informed that glucose has been supplied to Japanese soldiers for use on long marches.

THE conversion of the chemical energy of fuels to mechanical energy involves a complex chain of chemical reactions. One of the earliest reactions involved in muscular contraction is the breakdown of phospocreatine to inorganic phosphate and free creatine. This energy-yielding reaction is believed to be reversed by the formation of lactic acid from a precursor and it is only after this stage that oxygen is employed. These first two reactions can supply energy for work far in excess of the rate of oxygen supply: we say that the body has the capacity for accumulating an oxygen debt. When such a debt is contracted lactic acid escapes from the muscle and appears in the blood. Its concentration furnishes an index to the size of the debt. Since the concentration of lactic acid depends on the degree of exhaustion, it has been incorrectly assumed that lactic acid is a toxin and that if in some manner its accumulation could be prevented fatigue would not occur. A more logical view is that the attainment of high levels of oxygen intake may be favored by the accumulation of lactic acid. It has been proved that the heart prefers as a fuel lactic acid even to glucose and it may well be that both skeletal muscle and heart muscle are benefited by an increase in concentration (within reasonable limits) of the lactic acid in their environment.[2] Robinson in our laboratory has shown that the ability to accumulate lactic acid in exercise is characteristic of youth; with advancing years the capacity for accumulating lactic acid declines parallel to the decline in capacity for severe work. Briefly, the conception that lactic acid is the toxin of fatigue must be abandoned: instead we must look on it as a substance as physiological as glucose. While its accumulation has certain disadvantages these may be outweighed by the associated advantages.

So far I have made no mention of the place of protein in the diet. The roles played by the essential amino acids found in protein in growth and in nutritional well-being are well known. Little attention has been paid, however, to the relation of protein to the performance of work and the onset of fatigue. Some investigators have claimed that a low-protein diet is desirable for both physical and mental work while others are of the opinion that the optimal diet is high in protein.[3] Chittenden and Lusk represented these extreme views in this country. Lusk relates that after some months on an enforced low-meat diet in England during the War he and Chittenden had a beef dinner on a channel boat. They agreed that their sense of well-being was improved after dinner. Lusk attributed it to the meat, while Chittenden thought the sea breezes were responsible. In support of Lusk's view is the tradition among athletes that a beefsteak is the best preparation for a contest and the practice of experts in nutrition of prescribing a high-protein diet for soldiers. In support of Chittenden's view is the experience of millions in the East who pass their lives on a diet low in animal or vegetable protein.

The part played by protein in the diet has been brought to the fore this year by the report of Ray and associates[5] that gelatin increases the capacity for work. Six men after a period of training on the bicycle ergometer washed down with orange juice 60 gm. of dry gelatin daily for six weeks. Their capacity for work rose steadily for a month or more, finally attaining an output one-half or more higher than at the beginning. When gelatin was discontinued their work capacity diminished nearly to the control level. The subjects worked to exhaustion on the bicycle ergometer, the time varying from two to seven minutes. A large fraction of the work was done anerobically, that is, by accumulating an oxygen debt, and the authors suggest that gelatin increases the store of phosphocreatine and so the capacity for accumulating a debt. This hypothesis has some support not only from their experiments but also from the belief that the amino acid glycine, which is particularly abundant in gelatin, is used for building creatine. We expect next year to repeat their experiments, testing their hypothesis by direct measurement of oxygen debt. If it turns out that their conclusions are sound it may be that gelatin pills will take their place alongside salt and glucose tablets in modern mills and factories!

While the value of salt in the diet of men doing hard work in hot weather is now familiar, new light has been shed on its role by experiments that were being carried on at the Institute of Work Physiology in Dortmund, Germany, when I visited there last summer. Subjects on a salt deficient diet worked in a hot room until a state of exhaustion was reached. Systolic blood pressure and pulse pressure were dropping, the heart rate was rising and peripheral venous blood was becoming more and more oxygenated.

Shortly before collapse the subject drank a liter or more of 1% salt solution and within a few minutes, with work still going on, systolic blood pressure and pulse pressure increased and the heart rate dropped. They had produced heat

prostration by excessive sweating and loss of body fluids and even while work continued found the administration of salt solution effected a cure. I do not wish to imply that all cases of heat prostration are dependent on excessive loss of body fluids, but it is my opinion that many of the cases of prostration among men at work are in this category and that the provision of salt in the drinking water or in tablets as well as the advice to add more salt to the food will reduce the incidence of heat prostration.

THE relation of salt to heat cramps is proved. It is fitting to refer here to the fact that Dr. Glover began the use of salt tablets in steel mills in the Cleveland area 12 years ago. The slow process in application of scientific investigations is illustrated here. When we reached Boulder City in 1932 we found that the advice given to workmen was "Drink plenty of water!" And in Youngstown two years later in one large steel company the men who developed heat cramps were given glucose solution.*

Heat prostration may seem a far cry from fatigue but I dare say that fatigue without breakdown resulting from work in hot environments is a more important industrial problem than the relatively few cases of prostration that require hospitalization. It is a common experience that the tempo has to be reduced in many industries during hot spells and the explanation given is that the capacity for work is reduced because of fatigue. I am going to quote from a letter which Dr. P. H. Kennedy, of the Youngstown Sheet and Tube Company, wrote to me after his first summer's experience with the addition of salt to the drinking water:

> The Campbell Sheet Mill was the only hot mill that had the salted drinking water all of last summer. This department worked almost constantly throughout the summer, and in the worst heat wave we had last summer. It was not necessary to slow the mill down at any time; furthermore we had not a single exhaustion or cramp case in this department during the whole summer. Our experience in this department convinced me that we have the real preventive for cramps and in all probability for exhaustion as well.

The experience of Dr. Kennedy with salt tablets was that some men did not use them; cases of heat cramps continued to appear—usually among men who had taken little or no salt. A similar experience with the voluntary use of tablets has been reported by Mr. Don M. Conley, Safety Director of the Cabot Carbon Company. I am indebted to Mr. Thomas D. Cabot for the following quotation from Mr. Conley's report:

> At the beginning of the summer in 1937, we had the tablets on the job but left it up to the men to take them if they so desired. After having four cases of heat sickness in two days, we gave salt tablets to all the water boys with instructions to give each man one tablet in the morning and two in the afternoon, and to report any man refusing to take them. We also asked the cooks in our boarding houses to use more salt in the noonday food. After this we did not have any sickness or anyone overcome from heat. We had an average of about 230 men on each of the Wickett and Kermit jobs. We noticed the men did not seem to slow down in their work in the late afternoons, and they seemed to be cheerful. Some of this might have been due to the fact that they became more used to the heat as time went on.

It appears that some measures should be taken to insure the use of salt when conditions are severe and particularly early in the summer before acclimatization has taken place. Where possible, the addition of salt to drinking water seems most effective, but the administration of tablets under supervision may also be satisfactory. In either case some missionary work should be done when the practice is first instituted.

Since college football has become in the minds of many "big business," I think it is proper here to refer to the role of extra salt in diet of football players. Severe cramps are occasionally experienced in football players—sometimes during play and sometimes afterwards. It seemed to us that these cramps might be a type of heat cramps, for it appears that heat cramps may be produced by moderate work and extreme depletion of salt or severe work and moderate depletion of salt. It is now some years since we began supplying well-salted bouillion to Harvard football players and in that time no cases of cramps have occurred. A more rigorous test of our hypothesis has been given by Dr. F. G. Hall, of Duke University, during the past year. In that hotter climate men commonly experience severe cramps during the first two weeks of fall practice and hospitalization has been necessary in some cases. At my suggestion Dr. Hall began supplying bouillon last fall and cramps virtually disappeared. What is of more interest, it was the opinion of the players and of the coach that fatigue was less during the game than before, the men being able to continue effective playing for a longer time. In past years the team had the reputation of having to win their game in the first half, while during the past year, on the contrary, they frequently won by superior play in the last half or last quarter.

How can an extra intake of salt reduce fatigue from work carried on at high temperatures and lessen the danger of heat prostration? Probably the correct answer is that prostration depends on failure to maintain an adequate blood supply to the central area. At a time when the total blood volume should be increased to fill the peripheral capillaries, opened for extra heat dissipation, there may be a decrease because of sweat production. Salt water may make up the deficit or even help temporarily to increase the blood volume. With acclimatization various adaptive changes occur. Sweat becomes more dilute so that the loss of fluids creates a greater thirst than before acclimatization; satisfaction of thirst by drinking ordinary water leaves body fluids less and less depleted as acclimatization proceeds. It also appears from Bazett's studies[6] that blood volume itself increases during acclimatization.

MUCH of the fatigue experienced in modern industries involves small muscle groups and cannot have much dependence on the total of energy reserves or on temperature regulation.

The increase in energy transformation and in heat production of the body as a whole may be small and yet at the same time the supply of energy and of oxygen may be insufficient for some muscles.

The field of sport supplies an illustration of these contrasting situations. At one extreme the marathoner runs near the limit of his capacity for supplying oxygen at the beginning of the race and may be near the limit of his capacity for mobilizing fuel or for dissipating heat at the end. The high jumper, on the other hand, puts forth a sudden intense effort over a period of a few seconds. His total oxygen consumption is only a small fraction of his capacity and shortly after the jump he may appear to have completely recovered. Yet, if repeated often enough, the high jump may produce great fatigue though the total expenditure of energy is small.

Expressed in more general terms, we can say that fatigue depends on both quantity and intensity of work. It is my impression that increasing mechanization may reduce the quantity of energy expended per man but increase the intensity of energy expenditure by special muscle groups. This reduces the load on the heart and lungs and places the burden on the local mechanisms for transforming energy. As suggested above, a chain of reactions is involved in doing work, some of them being responsible for the contraction of the muscle and others for the restoration of the muscle to its original state. If the second contraction comes before recovery is complete we have the stage set for producing fatigue of the classical type,—the sort illustrated in every elementary course in physiology. Even though time enough is allowed for complete recovery, no muscle, even in the intact healthy man, is able to continue in activity indefinitely: its capacity will eventually become less and either the periods between contractions must be lengthened or the load must be reduced. Fatigue under such circumstances may involve not only the local muscles but the nervous system as well.

In factory operations that involve rapid rhythmic movements—as on assembly lines—it should be recognized that a suitable factor of safety should be provided for man as well as for machine.

Engineers tell me that for maximal service machines are not run at more than 50% of their capacity except in emergencies and it is my opinion that an even greater factor of safety should be allowed for the human machine.

If production is geared to 75% of the capacity of the most able workmen, breakdowns are apt to occur among the less able unless jobs at a slower tempo are found for them. There is no principle of human biology better established than that individuals within a species vary in psychological and physiological physical functions. The capacity for work, being the resultant of many functions, is extremely variable. It varies in the same individual, depending on social environment, nutritional state, age, sex, and disease.

Finally, I wish to emphasize a point suggested in my introduction, viz., fatigue may occur in the office as well as in the shop. I don't know the facts but I merely wish to raise the question: Is the pressure placed on the executives of modern industry producing ill-health, both mental and physical, and necessitating early retirement? I am well aware of the large number of executives who live long and active lives, but I have heard of enough cases of able men who have had to step out at an age when man normally reaches the peak of his powers to lead me to believe that we have here a problem that has not received the attention it deserves.[4]

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Southern Railway Surgeons

THE Forty-Second Annual Meeting of the Association of Surgeons of the Southern Railway System was held at the Willard Hotel, Washington, D. C., June 13, 14, and 15, 1939.

A splendid program comprising 19 interesting papers was enjoyed by about 250 surgeons of the Southern Railway System, who contributed liberally to the discussions.

A departure from the usual considerations of railroad surgery in the presentation of studies was the inclusion of papers and discussions on the current problems of organized medicine and socialized medicine.

The papers presented were of exceptional merit and the discussions, participated in by many, were lively and progressive.

The articles formally prepared for this meeting will be published, as soon as may be, in Industrial Medicine.

The Association elected the following officers for the year 1940, and selected Charleston, S. C., as the place of meeting that year:

President—Dr. F. Webb Griffith, Asheville, N. C.

First Vice-President—Dr. J. B. Johnston, St. George, S. C.

Second Vice-President—Dr. Hugh Black, Spartanburg, S. C.

Third Vice-President—Dr. B. S. Lester, Birmingham, Ala.

Fourth Vice-President — Dr. J. F. Mitchell, Washington, D. C.

Recording Secretary—Dr. W. W. Harper, Selma, Ala.

Asst. Recording Secretary—Dr. J. Marsh Frere, Chattanooga, Tenn.

Secretary-Treasurer — Miss Edith A. Foltz, Washington, D. C.

Internal Semilunar Cartilages

—*Diagnosis and Treatment of Dislocations*—

William H. Frampton, M.D.,
Charleston, South Carolina

IN REVIEWING the literature on this subject, I find that Hey in 1805 directed the attention of the profession to a certain group of symptoms at the knee.* The pathology was occasioned usually by slight violence, such as a twisting of the leg or a hyperflexion of the joint and having a decided tendency to reoccur. Only since the turn of the last century have such conditions been clearly connected with the displacement of the semilunar cartilages as the cause.

Such lesions as dislocations, ruptures and fractures involving the menisci are spoken of as dislocated semilunar cartilages. These structures are also termed meniscus medialis and lateralis, and again as semilunar fibro-cartilages. They are described in Gray's Anatomy as "two crescentic lamellae which serve to deepen the surface of the head of the tibia, for articulation with the condyles of the femur." The circumference of each cartilage is thick, convex and attached to the inside of the capsule of the knee; while the inner border is concave, thin and free. The cartilages rest upon the head of the tibia, each of which covers nearly the outer two-thirds of the articular surface. Both surfaces are smooth.

When a serious lesion occurs in one of the cartilages, a portion or all of the cartilage is displaced from its anatomical bed. Hence the term dislocation. The knee joint is formed between the longest bones and the amount of leverage which can be brought to bear is considerable.

The medial meniscus is more often dislocated than the lateral. The explanation of this fact probably lies in the anatomical construction of the knee joint. The internal cartilage is longer, more crescentic in shape and bifurcates at the anterior extremity. Furthermore, the mechanism which causes injury to the internal semilunar cartilage is more common than that to the external cartilage. What actually takes place causing a tear of either menisci is a sudden twist or rotation of the femur upon the flexed and fixed tibia. The tear in the cartilage may be longitudinal, oblique, transverse or irregular and the displacement may be in one or more directions.

The history, as given by the patient, together with the symptoms, is usually sufficient to warrant a definite diagnosis. However, it is rather improbable that anyone can, without an open operation, determine the extent of the lesion. The history usually given by the patient is that while in a crouching position with strain upon both the leg and thigh, sudden pain is occasioned with subsequent locking of the joint. The symptoms mainly are pain over the inner side of the head of the tibia, swelling and inability to completely extend the leg. The degree of the symptoms is generally in proportion to the severity of the trauma. Such an injury would not only cause a rupture of the cartilage but may also rupture the capsule and damage the synovial membrane as well. In such an event there would be increased fluid within the joint. There may be also injury to the ligaments and bursae. X-ray examinations do not reveal any pathology of the semilunar cartilages.

In my experience the final outcome of the accident depends in a measure on the promptness with which emergency treament is given. Usually a patient who has sustained such an injury makes an effort alone, or assisted by his friends, to unlock the joint. Naturally further damage can be readily produced. The principle of reduction embodies certain mechanics. Generally speaking, the idea is to reverse the position of the lower extremity at the time of the accident. There are several methods of reduction suggested. All do not work all the time, but with patience the dislocation is generally reduced. Ordinarily, a general anesthetic is not necessary. One might try the reduction starting with the leg fully flexed or fully extended. In the former, after the head of the tibia has been rotated and with the leg in extreme flexion, the patient is instructed to suddenly kick the foot forward, while at the same time the surgeon rotates the leg inward. If reduction has been successful, the patient should immediately thereafter be able to fully extend the leg. On the other hand, reduction may commence with the leg in extreme extension and with external or internal rotation of the leg followed by extreme but gradual flexion. When reduction has been accomplished, it is well to immobilize the joint either with adhesive plaster, an Ace bandage or a plaster of Paris cast.

Traction may be applied throughout 48 hours, if advisable. The patient should remain in bed a sufficient length of time for healing to take place. This will depend largely upon the extent of the injury. If the lesion of the cartilage is not severe, and complete healing takes place, after reduction the patient should experience no further locking. On the other hand, if under the above conservative treatment there is a recurrnce of locking of the knee two or three times, then an open operation is advisable.

Strict asepsis is of equal importance to that of surgical skill. The operating field should be very carefully prepared and during the course of the operation it is advisable not to touch inside of the wound even with a gloved finger. The matter of ischemia rests entirely with the surgeon. The author feels that it is not absolutely necessary especially if all bleeding vessels are ligated before the joint cavity is opened. The landmarks for the incision are the internal condyle of the femur, the patella and the medial head of the tibia. The incision is a very conventional one, starting over the medial aspect of the knee joint about the middle of the patella medial to its medial border, running distally to just beyond the tibial margin and then curving sharply downward and backward. At this point it is well to control all bleeding before the

* Presented at the 1938 Annual Meeting of the Association of Surgeons of the Southern Railway System.

capsule is opened. The incision in the capsule is naturally shorter than that through the skin. Care should be taken not to injure the internal lateral ligament. The joint cavity is now open sufficiently for inspection. By extending and flexing the leg, the torn or ruptured cartilage can be easily seen. It is my opinion that it is preferable to remove the dislocated cartilage than to attempt to suture it back in its normal bed. After the loose fragment has been removed the wound is closed in layers without drainage. A plaster of Paris splint should be applied from just below the groin to the ankle and halved before the patient leaves the operating room. This will allow loosening the cast in case of swelling and will allow free inspection of the incision. After the expiration of a week or 10 days the skin sutures are removed and the top layer of the cast put back in place. There seems to be a great variation as to the length of time that the patient should remain in bed after this operation. Surgeons of a generation ago kept the patient in bed from six to eight weeks. As time has gone on I find that surgeons are letting patients up much earlier. The author feels that if there are no complications it is well to keep the patient in bed at least two weeks. Some time after the expiration of two to three weeks the cast can be removed and the patient allowed to walk around with the aid of crutches. After the expiration of three or four weeks, weight bearing should commence. As soon as all immediate effects of the trauma produced by the operation have subsided, it is well to start gentle massage and heat, together with passive motion. The results usually obtained from this operation are satisfactory provided there is no injury to the joint at the time of the operation and if no infection takes place.

CONCLUSIONS: The internal semilunar cartilage can be torn, ruptured, fractured or displaced by a rotation of the femur on a flexed and fixed tibia; if the knee becomes locked subsequent to the injury several times, an open operation is advisable; an open operation performed under strict asepsis will result in a good and useful joint.

"Believe It or Not"

IT HARDLY seems possible . . . but the physicians and surgeons attending the conference on occupational diseases and industrial hygiene at Hotel Statler this week were chuckling at this:

"It seems that one of their members was busy in his office one day when the nurse came in breathlessly to tell him there was an injured man outside. 'He's blue in the face,' she said, 'and he has two men with him.' The doctor said, 'Bring him in quickly.' In walked the injured man, truly blue in the face, supported on either side.

" 'What seems to be the trouble?'

"And the companions answered, 'Gee, doc, we don't know. This guy was cut on the head and we put a tourniquet on him to stop the bleeding.'

"Yes . . . they put a tourniquet on him all right. The doctor found it around his neck."

—*Cleveland Press*, June 10, 1939.

Shoulder Dislocation

W. H. CLARK, M.D.,
Lagrange, Georgia

ABOUT half of all dislocations occur at the shoulder joint. It is particularly prone to dislocation on account of the peculiar structural arrangement. Only a small portion of the head of the humerus lies within the glenoid cavity and it has far less penetration into the joint than the femoral head does in the acetabulum. The glenoid cavity is deepened by a rim of cartilege and the joint is protected by muscles on every aspect except the inferior. The frequency of luxation is lessened by the unusual mobility of the shoulder girdle and the ease with which the clavicle is fractured.

The accident usually occurs when the supporting muscles are relaxed and during hyper-abduction the humerus is brought against the acromion which acts as a fulcrum and the head is prized out of the glenoid cavity and down through the weak inferior portion of the capsule. The head tends to move forward or backward until it becomes held by the remaining capsule and ligaments or rests up against some solid structure. Its location determines the variety of dislocation. When it moves backward it usually rests under the spine of the scapular. If it goes forward it usually stops under the coracoid process, which is by far the most common variety, the subcoracoid complete.

There is often intense pain, and shock is not unusual. The flexed elbow is supported by the sound side. In the anterior type of dislocation the shoulder has a flattened appearance from the absence of the head. On palpation the acromion process is prominent with a distinct depression below it. All the muscles of the joint are rigid and in spasm. The head of the humerus and the empty glenoid may sometimes be distinctly palpated. The physical signs are not as clear in the posterior variety. Differential diagnosis includes fracture of the neck of the humerus, fracture of the greater tuberosity, rupture of the supraspinatus tendon, and a combination of fracture and dislocation. It is of course only by x-ray examination that the true fracture as well as associated fractures can be determined. A lateral as well as an antero-posterior view is important.

Muscle spasm offers the chief obstacle to reduction. The old methods of prolonged traction to overcome spasm are unnecessary with the use of anesthesia. The cases of recurrent dislocation may sometimes be reduced without an anesthetic as well as a few of the cases seen immediately after the injury. The underlying principle of manipulation is to dislodge the head of the humerus from its new location and to help it to retrace the course by which it left the socket. The two most common methods of manipulation are Kocker's maneuver and a modification of the old heel- in- axilla method. An accurate diagnosis, early treatment and gentleness in manipulation are the important things to remember. If several days or weeks have elapsed since the

injury, too ambitious efforts at reduction are very prone to produce injury to the soft structures and possibly fracture of the humerus.

It is most important that simple dislocations be followed until it is certain that the permanent function of the joint has not been impaired. The Fracture Service of the Massachusetts General Hospital report that the cases of dislocation associated with fractures show 20% better end results than the cases of simple dislocation. This was due to the fact that after care of the uncomplicated dislocation was thought to be of no importance. Simple dislocation is frequently considered a trivial injury and for that reason after care is neglected. Within a few days the arm should be moved, staying within the limits of pain. This should be carried out daily until complete abduction can be obtained without pain. Heat and massage should not be neglected.

Complications are fracture of the greater tuberosity, fracture of the head and fracture of the neck of the humerus. Two interesting complications are recurrent dislocations and rupture of the supraspinatus tendon. Every case of simple dislocation should be considered a potential case of recurrent dislocation. This disability is a result of extensive injury of the inferior and anterior portions of the capsule and other structures. The injury can not be determined at the time of the accident. When palliative measures fail and the disability seriously interferes with work and happiness an operation has to be considered.

Conclusion: Functional results of simple dislocation are often far from satisfactory. Traumatism produced at the time of reduction, by a lack of gentleness, insufficient relaxation of the muscles and a lack of interest in the after care are the points we should like to stress.

An Industrial Department of Health

Book Reviews by

C. O. Sappington, M.D., Dr. P.H.

With increasing interest in industrial health and its various phases, this booklet copyrighted by Northwestern University in June, 1939, comes at an opportune time.

The bulletin is essentially an outline of information with respect to industrial medical departments.

A glance at the table of contents, especially the main headings, gives a fairly good idea of the material contained in the publication: Principles and Policies of an Adequate Medical Service; Organization of an Industrial Medical Department (including personnel, qualifications, hours, accessory services, dispensary space and arrangement, and records); Physical Fitness for Work (including consideration of the pre-employment examination and its ramifications); The Maintenance of Physical Fitness (a discussion of the periodic physical examination, hygiene of the working place, sickness as an economic problem, emergency service, and sickness prevention); Care of Those Injured While at Work (including first aid, hospital and home care, convalescence, rehabilitation, accident prevention, and safety work in general); Occupational Disease; Hospitals—Community vs. Company; Compensation (for accidents and disease); Settlement of Claims and Disputes; Accident and Occupational Disease Reports; and Special Community and Shop Relations (including community relations, recreation and other subjects).

As the preface states: "The physical well being of industrial employees becomes, then, a matter of importance to both an industry and the community in which it is located. Disability of an industrial employee due to sickness or injury is a burden both on industry and the community in which he lives. There is a simple and direct relation between the injury which an industrial employee may receive while on the job and the industry itself. Accidental injury is one of the recognized hazards in industry and is almost universally accepted as an item in the cost of production. Only certain types of illness are definitely chargeable to occupation. Sickness does not usually have a direct relation to occupation. Sickness of any degree, however, results in decreased efficiency of workmen."

Considerable space is devoted to the subject of physical fitness for work, considering examinations, for which there are several types of records illustrated. Similarly, there is an outline with reference to the making of an industrial health survey with a record form and also what is known as a survey outline.

Under the heading "Occupational Disease" the following statement is made: "Among all the various sickness disability cases that can occur among industrial workers there is no sickness disability that requires more experience and knowledge than the differential diagnosis of an occupational disease. Because of the fact that at present in most industrial states there are compensation laws covering most occupational diseases, it is imperative that medical service competent in this particular field is available to all industries."

The subject of compensation for accidental injury and occupational disease cases has been one of great interest to industrialists for some time during the recent past. As to the former, the bulletin states: "It is evident that in the compensation field an industrial physician must be familiar with the law in such matters and the accepted rules of the local compensation board if his service is to be satisfactory." Regarding the latter (compensation for occupational disease cases) it is stated that "because of the inherent difficulties of all occupational disease compensation claims, industrial physicians should have special training and experience, if they are to be of real help in adjusting these claims. The basis of all medical judgment in any one of these cases is an accurate knowledge of the exposure and opportunity for thorough physical examination. It should be remembered that in face of the problem of a workman who claims or has evident disability it is not enough to know that he does not have an industrial disease, but the cause of his disability must be known and demonstrable."

The settlement of claims and disputes, however, is a different subject, and the attitude taken is as follows: "The settlement of claims is not a medical service. It is the doctor's obligation to employer and to employee to determine when there is disability and the degree of disability, but the amount of compensation must be left to the claim department. The doctor must stick to his professional job if he wishes to maintain his standing with both workmen and management."

This Bulletin No. 9 of a series published by the Northwestern University Medical School, Department of Industrial Medicine, contains basic information for those whose responsibility it is to inaugurate and continue an industrial medical service. Paperbound, size 8⅜"x5½", the bulletin contains 56 pages, and is priced at $2.00.

Synopsis of Clinical Laboratory Methods

The second edition of the above-named book by W. E. Bray contains 408 pages, 51 text illustrations, and 17 color plates.

As the author states, "New tests or modifications of those already in use, are developing rapidly, but much of the useful information is scattered through many books and numerous journals and is not readily accessible. The object of this synopsis is to bring together in a small

volume for ready reference the more recent information and the most frequently used methods of laboratory diagnosis."

Among the additional procedures in the second edition are: serum phosphatase determination, titration of staphylococcus antitoxin in the blood serum, Ivy bleeding time, peroxidase-Giemsa staining method, cough plate method for diagnosis of whooping cough, opsonocytophagic test for determining the immunity status in undulant fever, the halo or diffraction method for measuring erythrocytes, vitamin C titration, determination of cyanates in the blood, 'phthalein elimination curve, determination of sulfanilamide in the blood, the differential heterophile agglutination for infectious mononucleosis, test for morphine in the urine, and the optimum dose titration of antigen for the Wassermann test.

Consideration is given to the usual subjects, such as urinalysis, hematology, blood chemistry, gastric analysis, feces and intestinal parasites, puncture fluid examination, sputum, bacteriology, water and milk examinations, serology, basal metabolism, allergy tests, poisons and foreign substances, surgical pathology, and various reagents for laboratory use.

In the section on Poisons and Foreign Substances, tests are given for the identification of mercury, arsenic, lead, cyanates, and carbon monoxide, which are of especial value to the industrial physician and surgeon.

The book is bound in semi-flexible material and is of such a size as to be very convenient as a handbook. The volume is published by C. V. Mosby Co., St. Louis, and is priced at $4.50.

Clinical Laboratory Methods and Diagnosis

THE second edition of Gradwohl's book of the above title is a veritable mine of information of 1607 pages on all sorts of procedures with reference to clinical laboratory methods and procedures of diagnosis.

Due consideration is given to the analysis of urine, blood chemistry, hematology, gastric contents, puncture fluids, sputum, feces, bacteriologic procedures, serology, basal metabolism, postmortem examinations, tissue cutting and staining, preparation of museum specimens, toxicologic technique, and parasitology and tropical medicine. A new section has been included in this edition on the detection of crime by laboratory methods. More than 100 pages have been added to the chapter on hematology and 24 full page color plates have also been used for the first time in reference to the text on hematology.

Of particular help are the differential diagnostic tabulations which have been made with reference to certain clinical laboratory procedures; as an example, one finds valuable information regarding the type of blood picture that one may expect to encounter in a certain list of diseases at the height of the infection.

As supplementary information with reference to laboratory technique, a chapter has been prepared on minimum supplies, equipment, and reagents for pathologic laboratories.

An extensive index of 74 pages is a distinct aid in the use of this large book of 1607 pages.

Of especial interest to the industrial physicians and surgeons, are the sections giving information relative to the determination of lead, mercury, arsenic and carbon monoxide in tissues and body fluids, and also the section on the hematology of lead poisoning.

The book was published in its second edition by the C. V. Mosby Company, St. Louis, and is priced at $12.50.

The volume will be of great assistance as a reference work in any clinical laboratory and will be particularly useful in making determinations on human material when one is concerned with the various industrial poisons.

1938 Year Book

THE 1938 Year Books put out by Year Books Publishers, Inc., 304 S. Dearborn St., Chicago, present a unique opportunity to keep up with changes that have been made in the various medical fields. In this review, four of these books will be covered, including General Medicine, Dermatology and Syphilology, Physical Therapy, and General Therapeutics.

In General Medicine, the editors were GEORGE F. DICK (Infectious Diseases); J. BURNS AMBERSON, JR. (Diseases of the Chest—excepting the heart); GEORGE R. MINOT and WILLIAM B. CASTLE (Diseases of the Blood and Blood-Forming Organs; Diseases of the Kidney); WILLIAM D. STROUD (Diseases of the Heart and Blood Vessels); and GEORGE B. EUSTERMAN (Diseases of the Digestive System and of Metabolism).

Of especial interest to industrial physicians and surgeons is the section on pneumoconiosis, containing reports in reference to silicosis among workmen in iron mines—acute silicosis in lead miners—silicosis among metal miners—chronic lung changes in electric arc welders—and tuberculous anthracosilicosis. Certain portions of the section on tuberculosis may also be of particular appeal. The book has 840 pages, including illustrations, and author and subject indices. The cost is $3.00 postpaid.

The Year Book on Dermatology and Syphilology was edited by FRED WISE and MARION B. SULZBERGER. In this volume, especial attention is given to common fungus affections, mycotic infections, and allergy. All of these have now assumed great importance in industrial relationships. Syphilis has also assumed an important industrial phase and a great deal of space in the book is devoted to the occurrence and the therapy with relation to this disease. The volume is well illustrated, contains 719 pages, and is provided with ample references at the end of each section, and subject and author indices. The price is $3.00.

Edited by RICHARD KOVACS, the Year Book on Physical Therapy gives consideration to general physical therapy methods and applied physical therapy. Of particular interest to industrial physicians and surgeons are the sections devoted to arthritis and rheumatoid conditions; traumatic and orthopedic conditions; and neurologic and mental conditions. Under the heading "Industrial Disabilities," the relationship of physical therapy to industrial medicine is considered, along with diathermy treatment of industrial injuries, back injuries as industrial disabilities, compensation aspects of low-back conditions, estimation of permanent disability, fatigue and accident prevention, and others. The book contains numerous diagrams, tables, and illustrations—it has 486 pages with subject and author indices. The price is $2.50.

The Year Book of General Therapeutics was edited by BERNHARD FANTUS and AARON L. GOLDBERG. The usual subjects are found, such as therapeutic technique, antipathogen therapy, restoratives, tissue alterants, function modifiers, toxicology, and nonpharmacal therapeutics. In the section on toxicology, is information of particular importance to the industrial physician and surgeon, relating to alcohol, tobacco, bromides, arsenic, lead, fluorine, carbon monoxide, cyanide, and miscellaneous organic dusts. Wound antiseptics are also discussed, the subheadings being: chlorine bodies, iodine vapor, aniline dyes, carbamide, and zinc peroxide. The book is well illustrated, and indexed, and contains 544 pages. The price is $2.50.

It will thus be seen that all of these Year Books form valuable reference works, in compact form, covering the literature of the past year on the various subjects as noted.

Liability News

CIRCUIT JUDGE ARTHUR E. FISHER at Rockford, Ill., has held the Illinois workmen's occupational diseases act, which became effective October 1, 1936, to be unconstitutional. In this decision the court set aside an award of $4,795 previously made by the Illinois industrial commission to Emilio Reali, alleged silicosis sufferer, against the Liberty Foundries Company, of Rockford. Judge Fisher said that it was an arbitrary exercise of power for the Illinois legislature to attempt to say that a workman's last employer could be held liable for a disease an employee might have contracted during previous employment or otherwise. —*News Item.*

Industrial Medicine

Reg. U. S. Pat. Off.

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On Writing

BY WAY of suggestion, rather than criticism, it has come to us that some of our readers think the articles we publish are often too long. The idea seems to be that if they were more condensed they would be more readable, and there could be more articles in each issue. One reader even broached the thought of printing only abstracts, in the manner of *Readers' Digest*.

We have had some long articles, and now and then a very long one. And, no doubt, there have been articles that seemed long, whether they were or not — from lack of interest in the particular subject, or possibly because we do not continue articles from their first or second page in the front part of the magazine to a page in the back part.

But there is more involved in the matter of length or lack of it than is apparent in any quick judgment. Our long articles come from men who write from long interest in, and long experience with, the subjects of their essays. They gather their materials and their inspirations from sources often personal, sometimes intimate, usually as close to heart as to hand. At a certain period in the development of the text, they desire to find out what has been written on the same subject by others. And at a certain moment in the study of the literature there is the reaction that it might be well — it would certainly be easier — if *someone* had gone to the pains and trouble of really covering the subject. Then, of course, the article in work goes on to completion. If it is intended for us, it comes to us, and it is then examined, not for length or the opposite, but principally to ascertain if the author's thoughts and his writing preserved the consistency that kept him going as long as he had something to say, and stopped him when he didn't. It is not characteristic of medical authors that they exhaust their subject and still keep on about it. And thus our policy, if such it may be called, is that no article is too long if it really says something.

We live in the hope that the articles in this journal may come to have the finish and completeness that will enable the next writers on the same subjects to read them and go on from there. Often we have felt that hope almost realized.

On the matter of shortening, one experience comes to mind. The editor and the author collaborated in the process, and after the lapse of two days of working time and the weighing of each individual sentence, the net result was that 5000 words became 4600. As to abstracts and digests, we believe our readers prefer the *original* text — which, after all, must exist before it can be capsuled. We shall, therefore, continue to take articles as they come, with no restrictions on their authorship except in the one particular that good writing, on any subject, consists in having something to say, and saying it, and then stopping.

The Knudsen Award

THROUGH arrangements made by WILLIAM S. KNUDSEN, the AWARD for the most outstanding contribution to industrial medicine during the year — given this year for the first time by MR. KNUDSEN in person — will be made annually upon the responsibility of the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS. The Committee appointed to make the selection for 1939-1940 includes DR. CASSIUS H. WATSON (Chairman), DR. LOYAL A. SHOUDY, and DR. CAREY P. MCCORD. It may not be possible for MR. KNUDSEN to be present at all future Annual Meetings, when the AWARD will be given — although we believe he is enough interested in industrial medicine and its developments from year to year to want to be — and so, to place its bestowal within the Association's range of privilege, the Committee has the designation of "President's Award."

Last year's Committee gave consideration to a number of entries. The AWARD is of such significance as to make it an honor to have been on the list from which the recipient was chosen. The Committee in the nature of things must be a "receiving" group until the last moment, the eve of the 1940 Annual Meeting. It can begin "receiving," however, at any time from now on. It is to be hoped — indeed it is even likely — that its task, difficult in any event, may be increasingly difficult. Which is to say that there ought to be more entries this year, and the more the better — as an indication of the continuance, in the future of industrial medicine, of the quality of progress that has distinguished its past.

INDUSTRIAL HEALTH AND DISEASE

Investigational Advances of Air Hygiene Foundation of America

HISTORIAN J. T. ADAMS has observed that "Today people are thinking to a very great extent — some of them entirely — of what a corporation is doing for the general social good."* The 250 corporations affiliated with Air Hygiene Foundation have contributed to the welfare of their approximately 1,000,000 workmen, and therefore to "the general social good," through the work and accomplishments of this organization during 1938-39. Air Hygiene Foundation is a nonprofit, science organization with headquarters and a multiple fellowship at Mellon Institute. It represents a collective effort by employers in behalf of employee health. The foundation, in addition to its pure, fundamental research in industrial health, provides member companies with practical, plant applications to prevent industrial illness and to foster industrial hygiene.

During the year the foundation's preventive engineering committee, headed by Philip Drinker, of the Harvard School of Public Health, prepared and issued eight bulletins detailing chemical and engineering measures for safeguarding occupational health. These publications, covering a wide range of current, everyday plant problems, are as follows: "Determination of Benzol Vapor in the Atmosphere," "Use and Care of Respirators," "Determination of Chlorinated Hydrocarbon Vapors," "Design of Exhaust Hoods," "Design of Duct Work for Exhaust Systems," "Determination of Lead in the Air," "Identification of Industrial Dusts," and "Routine Sampling for Control of Atmospheric Impurities."

Each month the foundation issues a digest of latest pertinent literature on industrial hygiene, thereby keeping its member companies constantly posted on progress. Approximately 1000 separate articles were abstracted during the year. An exhaustive legal study covering "Compensation Legislation—A Critical Review" was completed and released early in the year, as were the full proceedings of the 1937 meeting. Two information circulars were produced. A number of special articles, describing activities of the foundation, were published in medical, engineering, and managemental journals.

Meanwhile, under research grants from the foundation, scientific investigations progressed at Mellon Institute, Harvard University, the University of Pennsylvania, and the Saranac Laboratory.

Various well-indicated, short-time studies are conducted at the institute under the supervision of H. B. Meller, senior fellow. Plant surveys and special investigations are being made almost continually for member companies through the foundation's laboratory in the institute. Also through its headquarters here the foundation serves as a central agent for the collection, correlation, and dissemination of data on industrial health subjects. This useful function helps curtail costly duplication and aids in orderly advancing our frontiers of knowledge.

Two graduate fellowships were established by the foundation at Harvard University to investigate engineering problems. These fellowships will train men in industrial hygiene and help build up a skilled personnel to meet the increasing demand for specialists from industry and government. One fellow will study fundamentals of hood design for control of gases and vapors where low velocities are permissible. The other fellowship will relate to the identification and distribution of dusts in tissue.

The preventive engineering committee advises that

"The question of 'what is the best apparatus and method for dust determination?' is still about where it was a year ago. The Bureau of Mines has shown that the impinger is inefficient for collecting lead fumes in air and suggests the use of an electrical precipitator. The Bureau of Mines has described a midget impinger which is run at a few liters of air per minute, instead of 1 cu. ft. (28.3 liters). This equipment, very light and entirely hand operable, may gradually replace the large impinger, especially for work in mines. The various grab samplers are helpful, particularly for routine control."

S. R. WARREN, Jr., of the University of Pennsylvania, has reported on research in roentgenography being supported by the foundation which seeks to improve x-ray techniques for industrial purposes, as in large-scale medical examinations of groups of workmen. He and his associates experimented in taking parallel x-ray pictures on paper and film, and showed their results to 35 of the country's leading roentgenologists. These pictures revealed all stages of chests from normal to advanced forms of lung lesions. The experts were asked if the paper pictures were adequate for diagnosis and their answers were analyzed in order to prepare the groundwork for standardization of roentgenographic procedure in industry. According to Warren,

"It is apparent from the data so obtained that paper roentgenograms may be used for survey work if the technique is at least equal to that used in the tests and if means are available for following up suspicious cases by the use of stereoscopic roentgenograms on x-ray film. This conclusion is qualified by the fact, noted by most of the men who examined the films, that x-ray film has a wider range of density than x-ray paper. In conclusion, the results of this survey are interpreted in terms of the practical procedure necessary in industrial survey work."

L. U. GARDNER, director, The Saranac (N. Y.) Laboratory, has disclosed his findings in a study of "mixed" dusts and "protector" dusts which he is conducting under a foundation grant. His experimental data support the thesis that various minerals associated with silica tend to inhibit its action upon the body. While many substances may act as inhibitors, not all are equally effective. When the proportion of silica reaches 50% or more of the mixture, prolonged contact with the tissues may ultimately cause fibrosis. Early observations of metallic aluminum and the hydroxides of aluminum and iron indicate that each of these substances may be more potent in protective effects than numerous other minerals examined in the tests. He added:

"The data suggest that analysis of the rock being worked does not necessarily constitute a measure of the silica hazard in a particular industry. When more evidence has been analyzed it may be found practical to use the proportion of silica in the atmosphere as the basis of state codes. It is hoped that the modifying influences of other dusts may also be established upon a practical basis.

"The principles involved in these studies probably explain the variations in the rate of development of silicosis in different industries. Ultimately they may make it possible to neutralize the effects of silica upon the body. At present their influence is not sufficiently understood to be used in this manner. In the writer's opinion the major objective in the campaign against silicosis is still the elimination of silica dust.

* From Twenty-Sixth Annual Report of the Director, E. R. WEIDLEIN, to the Trustees of Mellon Institute, as published in *News Edition, Industrial & Engineering Chemistry*, April 10, 1939.

T. C. WATERS, of Baltimore, chairman, Maryland Occupational Diseases Commission and member of the foundation's legal committee, has commented on present legal trends as follows:

"Twenty-one states have laws compensating disabilities arising from occupational diseases. The laws already enacted have given rise to various controversial questions affecting the relationship of employers and employees. Their present and future administration will create further problems.

"The subject of time lost by industrial workers because of disabling illness, and the economic need for the prevention of such illness, with its attendant financial loss to employees, are of vital importance. As disabilities caused by those diseases which we call 'occupational' are far less numerous than those caused by the other common ills of life, it is a matter of concern to industrialists today that occupational disease laws should not be administered as general health insurance laws, to provide compensation for time lost by employees owing to common ills.

"The 1939 sessions of the legislatures will enact new laws relating to this subject or amend laws now effective. Careful consideration should be given to this legislative program. These laws are the result of definite economic need to afford to employees adequate compensation for injuries they have sustained during the course of their employment. At the time of enactment employers were concerned about the additional cost to which they would be subjected, but to date it does not appear that the laws now effective have placed an unjust burden upon industry. It is too early to predict whether or not the administration of the laws presently enacted will be successful; but if they fail to accomplish the purposes for which they are designed, they should fail because of their inherent defects and inequalities, and not because of the attempt by employers to avoid the imposition upon them of costs for compensating injuries resulting from operations to which their employees have been subjected."

FURTHER employee health improvement was the theme of the third annual fall meeting of the foundation held at Mellon Institute November 17, 1938, which was attended by more than 200 industrial executives representing companies throughout the country. Besides progress reports on research projects, authorities discussed the social and economic implications of the foundation's activities.

W. E. Hotchkiss, of Carnegie Institute of Technology, former president of Armour Institute, pointed out that, according to competent estimates, 200,000,000 working days are lost annually because of illness, meaning losses of hundreds of millions of dollars to employers and their employees. "The only question about the future of a problem like this," he continued, "is whether it is going to be handled sanely and constructively, and in a consecutive way based on science, or whether it is going to be handled emotionally and restrictedly and unintelligently."

V. P. Ahearn, executive secretary, National Industrial Sand Association, explained explicitly the interest of industry:

"A steady job, decent hours with good pay, is no longer the sole criterion. To that must be added industrial health. It is often characteristic of government that, when it swings with the pendulum, it swings too far and thus aggravates rather than cures. Unwise occupational disease laws have been written, but who can deny that there is an irresistible trend toward the enactment of such laws in every State? Those laws are responsive to the apprehension of employees about health hazards in industry. Industry will do well if it recognizes that fact and meets it intelligently.

"This question of industrial health is not the single problem of a single industry. Neither is it an emotional nor sentimental problem. It is a practical problem for industry as a whole to solve. Statutes of themselves will not provide industrial health. As in the case of industrial accidents, industry has always shown a capacity, once it recognizes and confronts a problem realistically, to make steady progress toward its solution. Air Hygiene Foundation presents a useful vehicle through which industry can pool its forces in eliminating or controlling hazards to health in industry."

Other addresses were made at the meeting by E. P. Pendergrass, of the University of Pennsylvania, member of the foundation's medical committee, by R. R. Sayers, U. S. Public Health Service, also a member of the medical committee, and by T. F. Hatch, New York State Division of Industrial Hygiene, a member of the preventive engineering committee.

With the growth of industrial hygiene units in the various states (29 have been established to date) and the work of federal agencies in this field, the foundation has been able to cooperate to a considerable extent in these governmental activities. Publications and data are exchanged and a mutually helpful spirit of collaboration has developed to an encouraging degree. The year has also been marked by heavy requests from the public for information relating to industrial health subjects. The foundation makes every reasonable effort to fulfill such needs for facts. There is an increasing public insistence that the talents of industrial management be directed to a greater degree toward public welfare, as well as toward private enterprise. And there are more and more indications that management is heeding the demand for broadened socio-economic leadership. A concrete illustration is the existence of Air Hygiene Foundation which, beyond its contributions to work-a-day health, reflects favorably upon the progressive policies of those 250 companies and associations supporting this work, which benefits not only the employer, but also the employee and the community.

Industrial Health Council

THE third meeting of the Council on Industrial Health took place January 11 at the Association Headquarters.* Those attending were Drs. Harvey Bartle, Leroy U. Gardner, Henry H. Kessler, Anthony J. Lanza, Allen D. Lazenby, Earl D. Osborne, C. W. Roberts, Stanley J. Seeger, Clarence D. Selby and Carl M. Peterson. Drs. Seeger and Lazenby were elected chairman and vice chairman respectively for the 1939 term.

Other transactions of interest to the profession were as follows:

1. Committee on Nomenclature reported that its project to provide the profession with a compendium of terms and acceptable definitions relating to industrial health is more than half completed. The authoritative character of the final published material will be augmented by the use of consultants.

2. The Council has on file information regarding most agencies interested in industrial health. It is planned to attach information of this character in the form of an appendix to the published material on nomenclature.

3. Data regarding available opportunities for instruction of physicians in the fundamentals of industrial hygiene were presented. Inadequate provision of undergraduate, graduate and postgraduate training resulted in the formation of a subcommittee to determine the most effective contribution the Council could make for improvement.

4. Additional plans were made for the issuance of useful and authoritative articles to impress on the general profession its opportunities and responsibilities in the industrial health movement. A series of articles is contemplated on medical organization in industry.

5. The Council decided to continue the Congress on Industrial Health as an annual function.

6. At the request of the Council, committees on industrial health and related subjects have been formed in a number of the state medical associations. The importance of these groups and the necessity for regular interchange of information was recognized. A subcommittee was formed to undertake this assignment.

7. The Council decided to continue the development of a clearing house

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* *J.A.M.A.*, March 18, 1939.

of information as a necessary and desirable service to the medical profession.

8. The best means for analysis and review of medical progress, standards and interest under workmen's compensation procedure were discussed, especially cooperative action with official agencies in the constituent and component societies. In this connection the Council undertook to explore the possibilities for a more scientific approach to the relationships existing between trauma and disease to determine if therein lie better prospects for extraprofessional understanding and acceptance of medical opinion regarding etiology.

9. Conversations with representatives of rehabilitation and compensation groups were deferred until the Council had a better opportunity to discover the exact nature of the problems under discussion and the degree of medical interest involved.

10. The relations of the Council on Industrial Health with the sections of the Scientific Assembly, more particularly the Section on Preventive and Industrial Medicine and Public Health, were considered.

11. The Council agreed that its activities would be facilitated by holding two meetings annually, one in conjunction with the Annual Congress early in the year, and another at midyear subject to adopted regulations.

12. The tenure of office of members of the Council was determined and nominations were considered to fill one vacancy in the present membership.

Physical Therapy Congress

THE eighteenth annual scientific and clinical session of the American Congress of Physical Therapy will be held September 5, 6, 7, 8, 1939 at the Hotel Pennsylvania, New York City. Preceding these sessions the Congress will conduct an intensive instruction seminar in physical therapy for physicians and technicians—August 30, 31, September 1 and 2. . . . The instruction seminar should prove of unusual interest to physicians and technicians. The clinics which comprise half of the schedule make this course outstanding for its practical value. As in the past outstanding clinicians and teachers will participate. Registration is limited to 100 and is by application only. For information concerning seminar and preliminary program of convention proper, address American Congress of Physical Therapy, 30 North Michigan Avenue, Chicago.

Doctor-Lawyer

DOCTORS with law degrees are being sought as members by the newly-founded American College of Medical Lawyers, a national organization with headquarters in Omaha, Neb. Some of the organization's purposes are to: (1) recommend desirable legislation; (2) encourage and sponsor postgraduate courses in medical jurisprudence; (3) elevate the standards of medical testimony; and (4) advise on medicolegal problems. Candidates for membership may obtain further information from Drs. Fred J. Schwertley, 613 Barker Building, or John H. Thomsen, 205 South Thirty-seventh Street, both of Omaha; or from Dr. Louis J. Gelber, 550 Mt. Prospect Ave., Newark, N. J. Eastern meetings will be held at the New Jersey and New York academies of medicine.

A similar organization—the American Medico-Legal Association — announces that it is "listing" all physicians who also are privileged to practice law. For this purpose, Dr. Frederick C. Warnshuis, its president, would appreciate receiving from each double-degree holder his name, address, educational record, and a statement as to whether he is now engaged in medicine, law, or both. The A.M.L.A. is located at 137 Newberry Street, Boston, Mass.

—*Medical Economics*, June, 1939.

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